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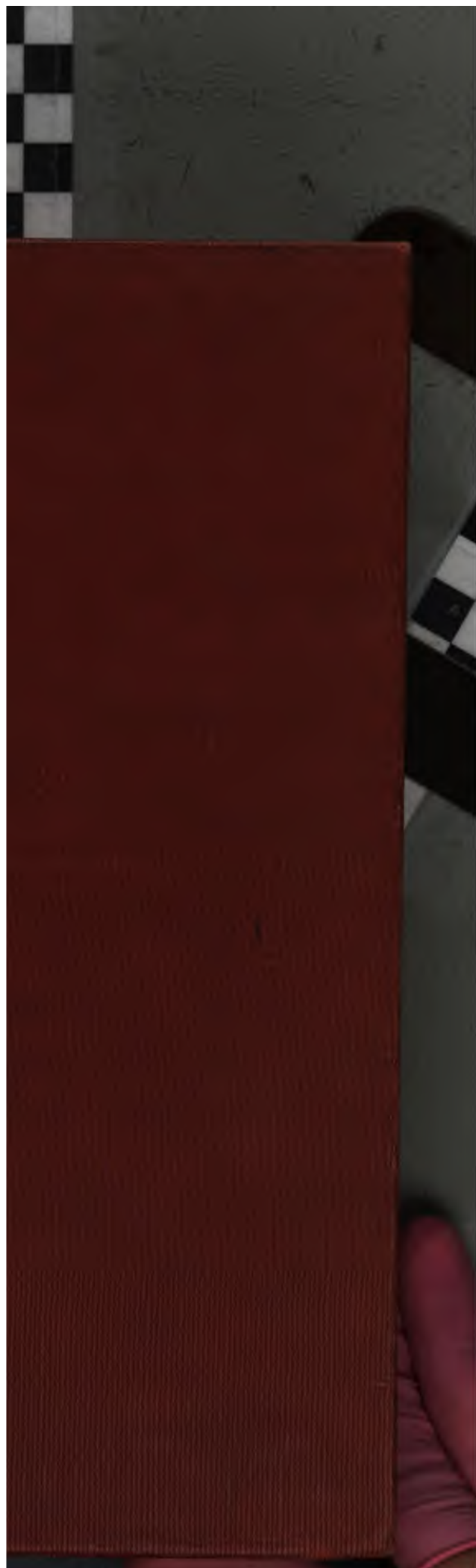
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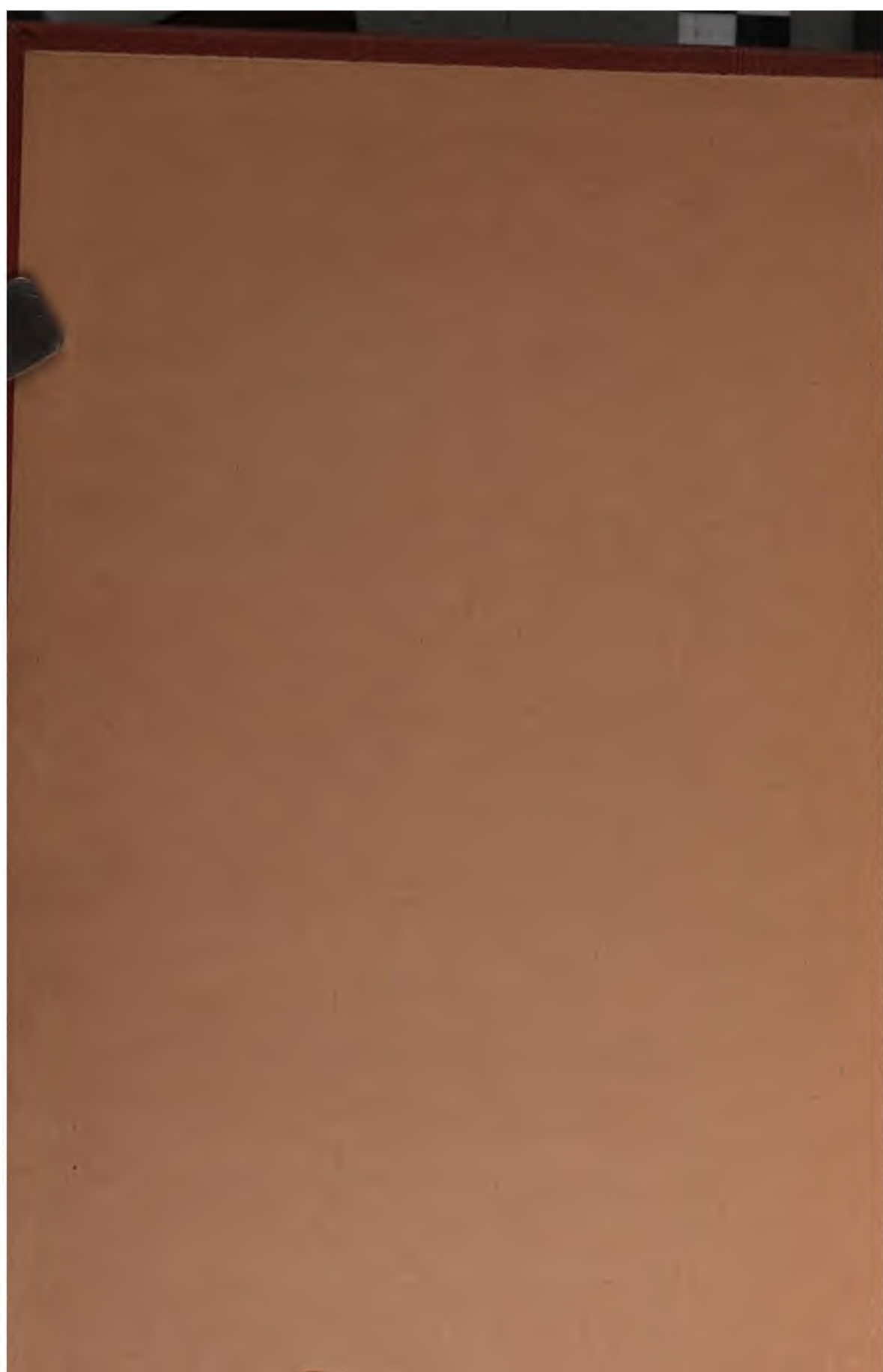
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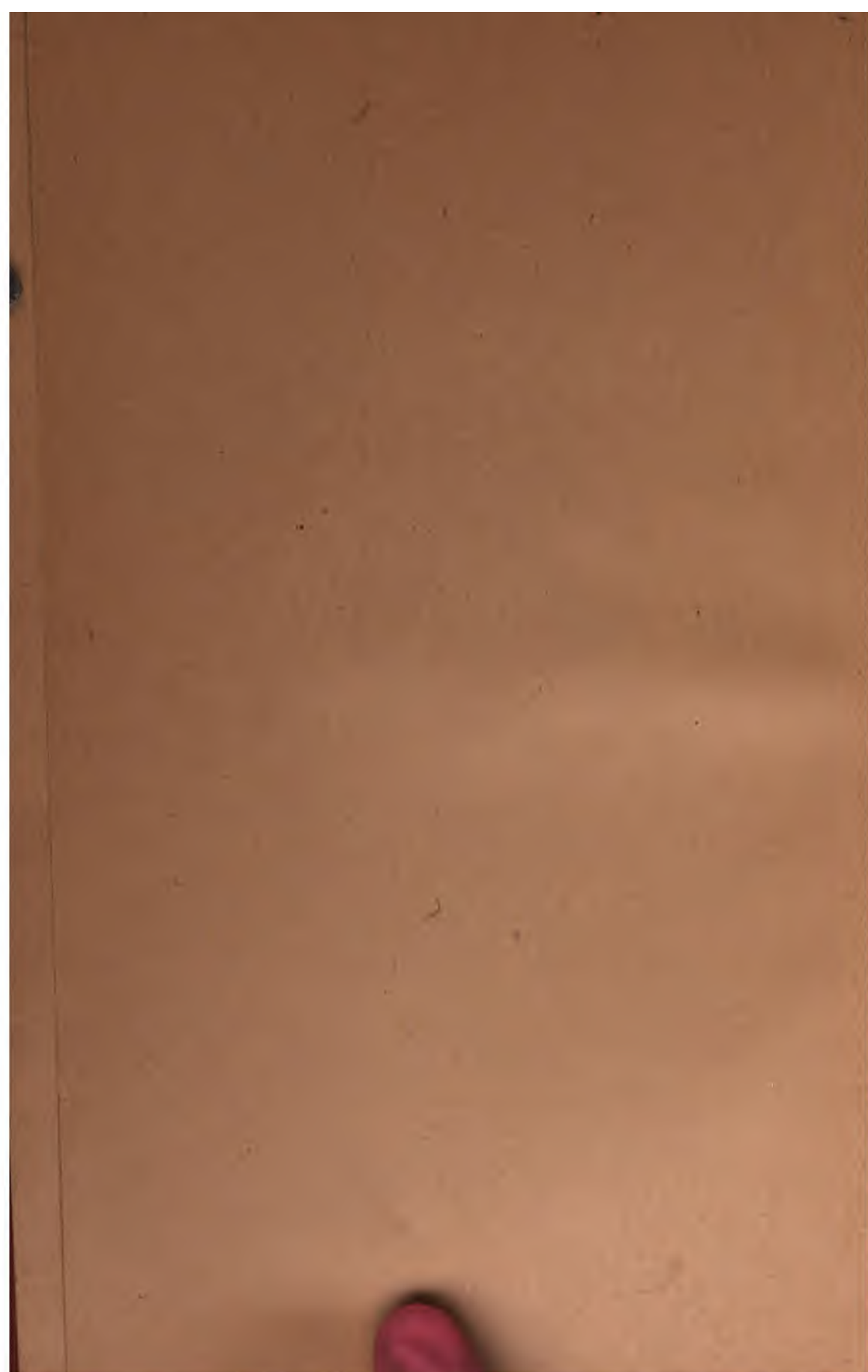
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REPRODUCTION SERIES, No. 5

AN INVESTIGATION OF THE PROPERTIES OF THE SAN-
GUINARIA CANADENSIS; or PUCCOON

By WILLIAM DOWNEY, of Maryland

Member of the American Linnean and Philadelphia Medical Societies.

TRAVELS THROUGH THE INTERIOR PARTS OF NORTH
AMERICA IN THE YEARS 1766, 1767 AND 1768

By J. CARVER, Esq.

Captain of a company of provincial troops during the late war with France. Illustrated with Copper
Plates. London. Printed for the Author, and sold by J. Walter, at Charing-cross,
and S. Crowder, in Pall-mall Row. MDCCLXXIII

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By ANTONIUS STÖRCK. MDCLXXI

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An Investigation of the Properties of the Sanguinaria Canadensis; in Puccinum. By William Downey, of Maryland, Member of the American Linnæan and Philadelphia Medical Societies.

Travels Through the Interior Parts of North America in the Years 1766, 1767 and 1768. By J. Carver, Esq., Captain of a company of provincial troops during the late war with France. Illustrated with copper plates. London. Printed for the Author, and sold by J. Walter, at Charing-cross, and R. Croyder, in Pall-mall Row. MDCCCLXXIII.

Tabellæ 18. Ussæ Medici. Palmaris Nigricantis. By Antonius Storch. MDCCCLXXI.

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Capt. JONATHAN CARVER.

From the Original Picture in the possession of J. H. Lettice M.D.

Published as the Act directs by R. Stewart, N^o 27 near St. Dunstons Church, Nov^r 1780.

STANFORD LIBRARY

CAPTAIN JONATHAN CARVER.

Our Frontispiece portrait of Carver is from the 3rd edition of his *Travels*, published in 1781 by John Coakley Lettsom, who purchased that edition, and the plates.

Jonathan Carver was born in 1732, at Stillwater, in the province of Connecticut. He was a grandson of William Joseph Carver, of Wigan, in Lancashire, England. At the age of 18, he purchased an Ensigncy in Connecticut, obtaining afterward the command of a company. Under General Webb, he took part in the battle of Fort William Henry, where General Montcalm of the French and Indian army was victorious. In 1758 he served as second lieutenant of Captain Hawks' company, commanded by Colonel Oliver Partridge, in the invasion of Canada, and in 1760, he was made Captain of a company in Colonel Saltonstall's regiment. In 1762 he commanded a company of infantry in Colonel Saltonstall's regiment. In all of these positions he acquitted himself admirably, both as concerns integrity and courage. The year after accepting his commission under Colonel Saltonstall, came the Peace of Versailles, 1763, when Carver retired from the army. But he was not content to remain in the lines of civil industry, and struck out into the forests of the great American West and Northwest, as an explorer.

Of rounded experience and good education, he was excellently qualified for descriptive writing, his narratives being both interesting and instructive. Lake Pepin and its vicinity took much of his time, and "Carver's Travels" concern much of that part of America, as regards quadrupeds, birds, fish, descriptions of the natives, vegetation and insects. The portion reproduced in the accompanying Bulletin is that which concerns trees, shrubs, roots, herbs and flowers.

In addition to the work now known as "Carver's Travels," Carver issued a pamphlet of fifty-four pages, on the subject of tobacco, accompanying same by two engravings of the plant, and an account of its cultivation on the American continent. (See Dr. Lettsom's edition of Carver's Travels.)

Captain Carver was rather above the middle stature, muscular in build, and of a florid complexion. He was sociable and affable with friends, but reserved when among strangers. In addition to his scientific descriptions, he touched the poetic, Dr. Lettsom stating that his verses "afford proofs of his lively imagination, and the harmony of his versification."

Notwithstanding the fact that Carver was very religious, and was considered to be a very moral and upright man, he deserted his American wife and children, and went to England, where he again married, thus casting a blot upon his record.

202694

After reaching England; 1769, and publishing his *Travels*, he became distressed in mind, body, and finances, and in 1779, in order to exist, he served as clerk in a lottery office. His vitality and strength were much reduced by depression of mind and body, as well as by the inroads of poverty, and on the 31st day of January, 1780, in the 48th year of his age, he died and was interred in Holywell-Mount burying ground, England.

A detailed biography of Carver may be found in the *Dictionary of National Biography*, by Leslie Stephens. Our brief notice is condensed, mostly, from Dr. Lettsom's Introduction to the 3rd Edition of the work. In this connection it may be stated that Dr. Lettsom's interest in Carver led him in the dark times of Carver's later life to devote both care and money in Carver's behalf, and to contribute much to the support of his English family, giving them the entire returns from the subscriptions to the third edition of the work, for which he, (Lettsom), had paid all expenses.

J. U. L.

AN
INVESTIGATION OF THE PROPERTIES
OF THE
SANGUINARIA CANADENSIS;
OR
PUCCOON.

BY WILLIAM DOWNEY,
OF MARYLAND.—MEMBER OF THE AMERICAN LINNEAN AND
PHILADELPHIA MEDICAL SOCIETIES.

“ Let no presuming impious railer tax
Creative wisdom, as if aught was form'd
In vain, or nought for admirable ends.”

THOMPSON.

PRINTED, FOR THE AUTHOR, BY
EAKEN & MECUM.
(1803.)

AN
INAUGURAL
EXPERIMENTAL INQUIRY,
FOR THE DEGREE OF
DOCTOR OF MEDICINE.
SUBMITTED TO THE EXAMINATION
OF THE
REVEREND JOHN ANDREWS, D. D.
(PROVOST PRO TEMPORE),
THE
TRUSTEES AND MEDICAL PROFESSORS
OF THE
UNIVERSITY OF PENNSYLVANIA,
ON THE
EIGHTH DAY OF JUNE, 1803.

TO DOCTOR RICHARD PINDELL,
OF MARYLAND.

SIR,

IN the dedication of this, the inaugural fruits of my medical education, commenced under your direction, I shall not consider, that any of my numerous obligations to you, which I with pleasure, thus publicly acknowledge, will be obliterated. Was my dissertation more worthy your notice, your virtues as a citizen, and your merits as a professional character, would alone claim this of me. The friendly instruction which you were ever ready to communicate, and the polite attention which I received from you and your amiable family, during my residence in it, shall always be recollected with gratitude. And that you may long enjoy that happiness, which it is your constant endeavour to communicate to others, is the sincere wish of

Your much obliged Friend,
and Grateful Pupil,
THE AUTHOR.

TO
BENJAMIN SMITH BARTON, M. D.
PROFESSOR OF
MATERIA MEDICA, NATURAL HISTORY AND BOTANY,
IN THE
UNIVERSITY OF PENNSYLVANIA,
THIS
DISSERTATION
IS INSCRIBED, AS A TRIBUTE OF RESPECT AND GRATI-
TUDE FOR NUMEROUS FAVOURS CONFERRED UPON
HIS FRIEND, AND
HUMBLE SERVANT,
THE AUTHOR.

ALSO, TO
DOCTOR FREDERICK DORSEY,
OF
MARYLAND,
THIS IS INSCRIBED, AS A MARK OF
HIGH ESTIMATION,
AND AS AN ACKNOWLEDGMENT OF THE MANY
ACTS OF KINDNESS
SHEWN DURING THE PUPILAGE OF HIS
SINCERE FRIEND,
THE AUTHOR.

EXPLANATION OF THE PLATE.

- A. THE tuberous, premorse root.
- B. A young involved leaf as it appears with the flower.
- C. An expanded leaf after the flower.
- D. An opening corolla, shewing
 - d. the calyx, which is a two-leaved perianth, and falls off as soon as the flower begins to expand itself.
- E. The scape supporting the corolla fully expanded.
- F. The pericarpium, which is oblong, ventricose, and bivalved; crowned, with its sulcated stigma.



NOV 19 1964

INTRODUCTION.

*WHEN we take a view of the vast number of vegetables with which our country is adorned, we must candidly acknowledge that our acquaintance with their medical properties, is extremely limited indeed. The investigation of their uses in the arts and as medicines, is an object of some importance to society. There is, perhaps, no portion of the globe that has been more highly favoured by nature in esculent and medicinal vegetables. The *zea* (maize) and potatoes, as articles of diet, stand unequalled; the *podophyllum peltatum*, *nicotiana*, *spigelia* and what has been emphatically called the vegetable antimony, the *eupatorium perfoliatum*, are medicines not inferior to any yet discovered. An infinite number yet remain to be investigated. To increase the list of articles in the *Materia Medica*, is not, however, a desirable object; but to expunge those which are nearly inert, and increase the number of active ones is certainly of the first importance. This taken into consideration, and with a view to the more easy procurement of our medicines, is of sufficient consequence to stimulate to an examination of our indigenous vegetables.*

*I have made a feeble attempt to investigate the properties and uses of the *Sanguinaria Canadensis*, a plant peculiar to our country. Most of*

the experiments have been repeatedly made, and are related with as much precision as I was capable of. Any errors which may have been committed, were through my inexperience in the business of experimenting. Circumstanced as I have been, little more has been done by me than the simple introduction of the subject. It is well worthy further investigation, both as it respects the science of medicine and the arts.

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BOTANICAL ARRANGEMENT.

THE genus *Sanguinaria* belongs to Linnæus's twenty-seventh natural order, Rhœdeæ. In his sexual system he places it in the class polyandria and order monogynia. The characters which he gives of the fructification are as follows: *

CAL. Petals eight,† oblong, obtuse, most expanding; the alternate ones interior, narrower.

STAM. Filaments very numerous, simple, shorter than the corol. Anthers simple.

PIST. Germ oblong, compressed. Style none. Stigma thickish, two furrowed with a stria the height of the stamens, permanent.

PER. Capsule oblong, bellied, acute at both ends, two valved, seeds very numerous, round and pointed.

* Translation by the Litchfield society.

† From eight to fourteen.

DESCRIPTION OF THE PLANT.

- 1st. Root. Is of a very indefinite size, varying in thickness from one fourth to half an inch in diameter, and in length from three to four inches. It is sometimes pretty straight, with a curvature at each end; that from which the stalk proceeds is always to be found, but the other is frequently a wanting, having the appearance of being broken. Numerous stringy fibres of two or three inches in length are observed to originate from the body of the root. A coloured liquor, that stains paper of a beautiful orange colour, is thrown out when a root is broken, from a great number of very minute veins.
- 2d. The petiole or foot-stalk of the leaf is round, generally from six to eight inches in length and thickness of a quill.
- 3d. The scapus or stalk which supports the flower, is of a like length with the petiole, but is not quite so thick. Both of them, when broken or squeezed, emit a coloured liquor, which stains of a very pale yellow. Near their origin from the root they are of a reddish colour, which becomes much more faint near the leaf.
- 4th. The leaves are cordate and lobate. The number of lobes are mostly five or seven, and their edges have a number of small indentations of unequal depths. There is but one leaf to a stalk, which stands nearly in a horizontal direction from the top of the

stalk. On each lobe, one large fibre of a very light yellow colour, may be seen running from the stalk, and many smaller ones branching from it in all directions.

OF ITS NATURAL HISTORY.

THE plant which is the subject of the present enquiry, is known by different appellations, in America, as the puccoon, bloodwort, red root, Indian paint, turmeric, &c.

PERHAPS it is one of the most abundant vegetables of our country. In the Florida's it is found to grow plentifully, and Professor Barton informs me, he has seen it as far north as latitude 43°, and imagines it extremely probable, that it extends much farther. We find it generally inhabiting a rich loose soil, and the declivities of hills. It is seldom or never found to grow in lands, which have been cleared of their timber, or in a state of cultivation. Its flowers generally appear about the first of April, and before its leaves put out.

ANALYSIS OF THE ROOT.

EXPERIMENT I.

HAVING obtained a quantity of the root dried, and reduced to a gross powder, six ounces of water were poured on two ounces of it; after standing twelve hours, the whole was subjected to a low degree of heat in a glass retort, to which a receiver was properly adapted. At the expiration of three hours, the liquor which had passed into the receiver, was examined, and found to be

perfectly colourless and insipid. On increasing the heat, a fluid slightly coloured, came over, which had the peculiar smell of the recent root, and was considerably acrid in the fauces. Neither the first nor the last portion was altered by the addition of a solution of the oxy-sulphate of iron. Paper stained with litmus underwent no change.

EXPERIMENT II.

SIX ounces of alkohol were digested in the sun, and one ounce and a half of the root, dried and reduced to a coarse powder, for the space of seven days; it was then decanted, and a fresh quantity added; after standing also the same length of time, it was put with the first portion in a glass vessel, and exposed to evaporation, in a gentle heat. Ninety-eight grains of resin, and extractive matter of a beautiful crimson colour, were obtained, of a warm agreeable bitter taste. One dram of this was triturated in a glass vessel, with some warm water, which was afterwards passed through a filter, and evaporated. On drying, and collecting that which was insoluble, in water, it was found to weigh sixteen grains; the saponaceous or extractive matter, which was soluble in alkohol, as well as water, weighed thirty-eight grains. In the course of the experiment six grains were lost.

HAVING dried the roots on which the alkohol had been digested, a quantity of boiling water was poured on them, which, after standing a short time, was passed through a filter, and evaporated. One dram two scruples of gummous matter were obtained, of a dark colour, and an acrid bitter taste: a small quantity dis-

solved in the saliva, and swallowed, produced considerable irritation in the fauces, which continued for several hours.

To ascertain what action the different principles of the root, had on the human body, in a state of combination, and when separated, the following experiments were made:

EXPERIMENT III.

HAVING breakfasted at eight o'clock, I took twenty grains of the recent root two hours after, my pulse beating seventy-six strokes in a minute.

Min	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	76	78	80	84	86	86	87	84	82	85	80	77	74	75
M.	75	80	85	90										
P.	73	72	73	74										

IN ten minutes I had a burning sensation at my stomach, pulse full and strong; twenty-five, a considerable nausea came on, my pulse very irregular, and not so full; forty, I had a slight head-ach, my face very pale; fifty, the nausea returning at intervals, rendered my pulse extremely irregular, in fullness and force. About three hours from the time of taking it, it purged me gently two or three times.

EXPERIMENT IV.

To my friend and fellow graduate, Mr. Young, four hours after dining lightly, I gave twenty-three grains of the pulverized root, made into pills, with honey. In fifteen minutes he

complained of a burning at his stomach, his pulse very quick, without much fullness; thirty, he had a great nausea; and in thirty-five, it operated most violently as an emetic, producing six or seven full vomitings. He drank a considerable quantity of warm tea, with the view of assisting the operation, and to allay the violent irritation which was produced in his throat. All the contents of his stomach, as well as the tea, on being discharged, were of a colour similar to the decoction of the root.

EXPERIMENT V.

THREE hours after dining lightly on veal and potatoes, my friend Mr. Rees, took eight grains of the extract obtained by alkohol from the dried root, his pulse beating eighty strokes in a minute.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65
Puls.	80	82	82	80	82	84	86	84	84	85	86	88	89

IN fifteen minutes he had a warmth at his stomach, which he compared to that produced by camphor, his pulse a little fuller; twenty-five, his pulse was strong and full; thirty-five, a slight nausea commenced; forty-five, he had eructations of wind from his stomach; sixty-five, he had one gentle motion to vomit.

EXPERIMENT VI.

To my friend, Mr. Young, I gave eight grains of the extract, obtained by decoction, with water, and evaporation, his pulse performing only fifty-eight strokes in a minute: in

twenty minutes, his pulse was increased to sixty-two, and had a warmth at his stomach: when forty minutes had elapsed, he became much affected with nausea, and was shortly after relieved from every disagreeable sensation, by discharging the contents of his stomach. It produced only two motions and those very gentle. He observed to me, that in this, as also in the former experiment, he experienced some difficulty in discharging his urine, having somewhat of an ardor urinæ.

EXPERIMENT VII.

HAVING breakfasted at eight o'clock. I took eight grains of the saponaceous or extractive matter, at half past ten, my friend Mr. Walker, attending to my pulse which was at its standard seventy-six.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	76	77	77	79	78	79	78	78	80	81	79	78	77	75
M.	75	80	85	90										
P.	76	76	75	76										

IN twenty minutes I had a slight nausea, my pulse diminished in fullness and force; thirty, my pulse very small and quick; forty, I had a disposition to puke, which, however, continued but for a very short time; fifty, the nausea had nearly disappeared, and my pulse became considerably fuller; seventy, my pulse was nearly natural in fullness and force, only being a little irregular.

EXPERIMENT VIII.

To my friend Mr. Bartram, four hours after taking breakfast, I gave eight grains of the gummous matter, his pulse beating seventy-eight strokes in a minute.

Min.	5	10	15	20	25	30	35	40	45	50	55	60
Puls.	78	78	80	81	80	83	83	82	80	80	78	82

IN fifteen minutes a slight nausea came on with a burning at his stomach; forty, he complained of a head-ach, the nausea, at intervals, much more violent; sixty, he was vomited twice, the motions were pretty strong.

EXPERIMENT IX.

TWO hours after breakfasting, my pulse at seventy-four, I took eight grains of the resin, my friend Mr. Walker attending to my pulse.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	75	75	76	77	77	76	75	77	75	74	74	73	74	74

IN twenty minutes my pulse was a little fuller, with an agreeable sensation at my stomach; from this time, through the whole course of the experiment, there was no perceptible change in my pulse, or my feelings, except what might be occasioned by continuing in the same posture for such a length of time.

ANALYSIS OF THE LEAVES.

EXPERIMENT X.

ONE half ounce of the leaves was boiled for half an hour, with a pint of water, which was then poured through a filter, and evaporated. Fifty-eight grains of a dark coloured extract were obtained, of a pleasant sub-acid taste. To the same leaves which were previously dried in the sun was added a portion of alkohol, which after digesting in a gentle heat for three days, was decanted and evaporated in a glass vessel. Twelve grains of resinous matter were obtained, which was nearly of an insipid taste.

To the fifty-eight grains of extract were then added, two ounces of alkohol, which after standing four days in the sun, was poured off and evaporated. Eighteen grains of saponaceous or extractive matter, were obtained.

EXPERIMENT XI.

MY friend and fellow graduate, Mr. Pendergrast, two hours after breakfasting, took four grains of the leaves powdered and made into pills, his pulse at seventy-six strokes in a minute.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Pulse.	76	78	79	80	80	82	80	82	78	77	74	72	74	76
M.	75	80												
P.	76	75												

IN fifteen minutes his pulse became fuller, and he had a sensation of warmth at his stomach; twenty-five he had a fullness in his head

with vertigo; forty, he complained of great debility and head-ach; sixty, he was affected with slight tremors, and very frequent yawning; eighty, his sensations were natural in every respect, but for a slight sickness at his stomach, which continued for several hours after.

EXPERIMENT XII.

TWO hours after taking a light breakfast, I took eight grains of the leaves made into pills, my friend Mr. Walmsley attending to my pulse, which was at its standard seventy-six.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	76	76	76	78	80	82	83	84	80	78	76	75	74	74
M.	75	80	85											
P.	73	77	76											

IN fifteen minutes I had a warmth at my stomach; twenty-five, my face was flushed, and had a fullness in my head with a slight vertigo; thirty, my wrists were cold, and a profuse sweat on my forehead; forty, a slight nausea came on, my pulse small and quick; fifty-five, my pulse was somewhat fuller, the affection of my head still continued, with slight involuntary motions of my muscles; eighty, my pulse was nearly natural, but I felt extremely languid, with a dull head-ach, which did not leave me for several hours.

EXPERIMENT XIII.

MY pulse at its standard seventy-six, I took four grains of the extract obtained by decoction with water and evaporation.

Min.	0	5	10	15	20	25	30	35	40	45	50	55	60	65
Puls.	76	76	76	78	80	82	84	86	84	82	82	80	78	76
M.	70	75	80	85	90	95	100							
P.	75	74	72	73	74	73	76							

IN twenty-five minutes I had a pleasant warmth at my stomach, my pulse full; thirty-five, my pulse was rather small and quick, with considerable tension; forty-five I was affected with tremors, as in the preceding experiment; seventy-five, I had a dull pain directly over my eyes, and felt extremely languid; ninety-five, my pulse was smaller than usual, and I had a disagreeable sensation at my stomach, that continued for the remainder of the day.

OF THE PERICARPIUM, OR SEED VESSEL AND SEEDS.

EXPERIMENT XIV.

HAVING procured two drams of the seed vessels and seeds not arrived at maturity, six ounce measures of water were boiled on them, until evaporated to two. Of this I took two dram measures, my friend Mr. Walmsley attending to my pulse.

Min.	0	5	10	15	20	25	30	35	40	45	50	55	60	65
Puls.	76	76	78	82	82	80	83	83	81	82	79	77	79	81
M.	70	75	80	85	90									
P.	76	75	75	77	76									

IN twenty minutes not perceiving that any other effect was produced than increasing my pulse a little in frequency, I took two drams

more; thirty-five, I had a glow of warmth over my body; forty-five, I took three drams more; fifty, I perspired freely, my pulse tense and quick, though not full; seventy, my pulse was extremely irregular; a torpor of my whole system came on, with very frequent yawning; ninety, my pulse nearly as full as usual, though not so strong, and fluctuating. I was not entirely free from the effects of it, in the space of two hours.

EXPERIMENT XV.

MY friend Mr. Wootton, two hours after dining, took five dram measures of the decoction, his pulse at eighty strokes in a minute.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	80	83	84	87	88	86	84	85	83	81	79	77	78	80
M.	75	80	85	90										
P.	81	79	78	78										

IN fifteen minutes his pulse was very strong and full; twenty it became smaller and tense; forty, his pulse was remarkably small and quick; fifty-five, he complained of great languor, with an irresistible propensity to yawn; his countenance pale: he mentioned that his vision was somewhat affected; the pupils of his eyes were evidently dilated more than usual; ninety, his pulse was nearly of its natural fulness, though very irregular, the languor still continuing, as also the propensity to yawn for some time afterwards.

REMARKS ON THE PRECEDING EXPERIMENTS.

FROM the result of the two first experiments, it appears that there is a gum, a resin, and a saponaceous or extractive matter in the root, but that the former preponderates considerably. In the leaves a still larger proportion is found to exist, and a much smaller quantity of saponaceous or extractive matter.

BY experiment fourth, it is shewn, that the root of our plant is endowed with powerful emetic qualities, when taken in the dose of fifteen or twenty grains. But in consequence of the irritation which is produced in the fauces, it is probable, that in the form of a powder, it will never come into general use. This inconvenience may, however, be obviated, by giving it in form of a decoction or extract. Eight grains acted as a very gentle emetic in experiment sixth, without having any such effect. It is but little inferior to the ipecacuanha, either in the certainty or speediness of its operation.

THE principle of activity resides chiefly in the gum and saponaceous or extractive matter, but more especially in the former. The resin possesses little or no activity. Perhaps the most certain preparation as an emetic, would be the gum; though combined with the saponaceous matter, as I have already said, it operates pretty certainly.

THE primary and most prominent effects induced by it, were a warmth at the stomach, an increase in the frequency and force of the pulse;

and if in a considerable dose, nausea and vomiting, in a smaller one, it increased in a remarkable manner the appetite. In all the experiments it had a tendency to produce costiveness, except in the third, when it acted gently cathartic.

THE powder of the root may be given as an emetic for an adult, in the dose of fifteen or twenty grains, made into pills; otherwise a considerable irritation will be produced in the fauces on taking it. As a stimulating tonic, two or four grains may be taken, if nausea be produced, the dose must be diminished. I have repeatedly experienced very sensible effects from taking one single grain.

THE experiments xii, xiii and xiv, evince a difference in the properties of the leaves and root.* Not only in these cases which are related, but also in several others not mentioned, they evidently induced tremors, head-ach, and a great torpor of the system. Such effects are only induced by substances, deleterious to the human constitution.

THE few experiments which I made with the unripe seeds, convinced me that they possessed a very considerable influence over the pulse, and a stupifying or narcotic quality.† Not

* That different parts of the same vegetable should possess powers extremely dissimilar, is a circumstance which frequently occurs, thus, in the *Podophyllum Peltatum* (or May apple,) a plant nearly allied in its botanical affinities to the *Sanguinaria*; we find the fruit esculent, the leaves deleterious, and the root cathartic. This, like many of the mysterious operations of nature, claims our admiration, though incapable of explanation.

† Professor Barton, in his *Essay towards a Materia Medica of the United States*, mentions, "that the seeds appear to possess nearly the same quality as the seeds of the *Datura Stramonium*," which are powerfully narcotic.

being able to procure any of the ripe seeds, which, in all probability, are more powerful, I was prevented from entering so fully into this part of my subject as I could have wished.

AS A COLOURING MATTER.

THE juice of the root making a very fine dye of an orange colour, has frequently been used by country people, for the purpose of staining flannels and woollen cloths.* But it unfortunately is one of those colours, which require an intermediate substance to give it fixity. For frequent washing, and exposure to the sun, destroy it entirely. Considering it of some importance, to discover a substance which would give it this permanency, by rendering it insoluble in water, I made several experiments—But previously, to ascertain what effects those substances commonly made use of as mordants, would have upon the colouring matter, I made the following:

A SMALL quantity of the *nitric acid* was added to some of the decoction of the root, which was nearly of a brown colour; a precipitate instantly took place, and the liquor changed to a muddy yellow colour.

ON adding the *muriatic acid*, the colour was rendered much more vivid, without any precipitation occurring.

* Professor Barton informs me, that the Indians also make use of it, as a dye for their baskets and articles of ornament.

THE *sulphuric* was attended with the same results as the *marine*.

Sulphate of alumine (or allum,) produced very little change in the colour.

Acetate (or sugar of lead,) destroyed the colour almost entirely, and after standing some time, a copious precipitate of a whitish appearance, fell to the bottom.

Tartrite of pot-ash (or cream of tartar) produced no perceptible change.

Murio-sulphate of tin, produced a beautiful mixed colour, between an orange and a red, without any precipitation taking place.

AN infusion, as also the alkohol of galls, produced a colour nearly similar to that of the *murio-sulphate of tin*, but after standing some time, a precipitate took place.

ON adding the *prussiate of pot-ash*, a dark coloured precipitate took place, after standing a short time, and the super-natant liquor was perfectly colourless; but on pouring in a very small quantity of *sulphuric acid*, the precipitate was redissolved, and the original colour restored.

HAVING premised these experiments, I shall proceed to relate the results of several which were made on pieces of flannel, silk, cotton and linen, with a view to discover a proper mordant for them.

EXPERIMENT I.

TWO ounces of *sulphate of alumine* (or al-

lum,) were dissolved in a pint of water; in the solution the strips of flannel, silk, &c. were boiled for fifteen minutes; when they were taken out, and thrown into a decoction, made by boiling a quart of water on two ounces of the dried root; after stirring them about for a few minutes, they were taken out and placed in the sun to dry. They had all acquired a deep orange colour; but on boiling them in some water, that of the cotton and linen faded considerably, the flannel and silk were but little changed.

EXPERIMENT II.

EQUAL quantities of the *sulphate of alumine* (or allum,) and *tartrate of pot-ash* (or cream of tartar,) were dissolved in some water, and pieces of flannel, &c. boiled in this solution. On taking them out and dyeing them, they acquired a colour nearly similar to that in the first experiment; but on treating them in the same manner, great part of the colouring matter was washed out, more particularly in the linen and cotton.

EXPERIMENT III.

A STRONG solution of the *acetate* (or sugar of lead,) was made with rain water, and the same process performed as in the other experiments. The result was, that the flannel and silk acquired a colour approaching to a pale red; but was considerably changed by boiling; the linen and cotton were at first but slightly tinged, and which was entirely washed out.

EXPERIMENT IV.

HAVING dissolved about two ounces of the *sulphate of alumine* in some boiling water, the different pieces of cloths were immersed in it, and as much caustic pot-ash was added as was sufficient to precipitate the *alumine*, by uniting to the *sulphuric acid*, and forming *sulphate of pot-ash*. After boiling them for some time, they were taken out and dyed; the flannel and silk exhibited a very fine orange colour; the linen and cotton retained much less of the colouring matter. Boiling in water rendered the colour more bright in the flannel and silk, but in the others nearly washed it out.

THIS experiment I varied a little, but not with exactly the same result. Having immersed the bits of flannel, &c. in the solution of allum, they were taken out, and a portion of *caustic ammoniac* poured on them, which uniting to the acid deposited the *alumine* on the bits of cloth. They were then dyed, but did not retain the colouring matter as well as in the other experiment.

EXPERIMENT V.

THE *murio sulphate of tin* made use of as a mordant, produced an orange colour tinged with red. Washing in water rendered it somewhat more faint, but both the linen and cotton, as well as the other bits of cloth, remained of a very bright orange.

EXPERIMENT VI.

DILUTED *sulphuric acid* was tried, as a mordant. All the pieces of cloth exhibited a vivid orange colour, but boiling water washed a considerable portion of it out.

EXPERIMENT VII.

A PIECE of white broad cloth was boiled with a solution of the *sulphate of iron*, and then dyed. A colour approaching to a drab was produced after washing.

OBSERVATIONS ON THE FOREGOING
EXPERIMENTS.

BY the first experiments, it appeared, that the colour was entirely destroyed by some articles, and by others, it acquired different shades, which might be varied at pleasure.

IN all the experiments made with a view to find a mordant, the flannel and silk acquired a deeper or lighter colour, which could never be entirely washed out. But in none was the orange colour retained so completely as in experiment fourth, when the alumine was used as the mordant. The murio-sulphate of tin produced a very handsome colour, which was sufficiently permanent; and was the only mordant that fixed it on the cotton and linen.

UPON the whole, by the foregoing experiments, I think it is ascertained that the sulphate

of alumine, or the alumine alone, and the murio-sulphate of tin, are tolerable good mordants for flannel, cotton, silk and linen.

THE colours produced by the puccoon are rich, and might undoubtedly, if taken in hands by one conversant in the business of dyeing, become one of their most valuable articles.

OF THE PROPERTIES OF THE PUC- COON AS A MEDICINE.

WE have seen that it is a powerful stimulant, and that when taken in certain doses, it excites vomiting. And that in small doses it acts as a general stimulating tonic, as is shewn by its increasing the appetite, and its action on the arterial system.

IT has been placed in the class of emetics by Professor Barton,* which is certainly its proper arrangement. Its most prominent effect being to induce vomiting even in moderate doses.

THE leaves and seeds ought to be classed with the incitants, for they evidently are powerful and diffusible stimulants.

IN common with other articles belonging to that class, they sometimes act as diaphoretic† and diuretics.

* See his collections for an essay towards a *Materia Medica* of the United States.

† My much esteemed friend Dr. F. Dorsey, of Maryland, informed me in a letter, that the root was frequently given by farriers to horses, with a view to induce sweating, and to promote the shedding of their old coats of hair.

As an errhine, the root finely pulverized, is perhaps inferior to none; a small quantity snuffed up the nose, induces an immense discharge and violent irritation.

OF ITS USE IN PARTICULAR DISEASES.

1. INTERMITTING FEVER. I have been informed by a very intelligent gentleman,* that a spirituous tincture of the roots, is very generally used by the inhabitants of low marshy grounds, in the southern states, as a preventive to the intermitting fever; and in what is called inward fevers, which is but an inferior grade, and is cured by the same remedies. From its general properties, very probably it might be a very useful medicine in this disease, in some particular states.

2. DYSENTERY. This being a disease, in the primary states, requiring depletion, and the careful abstinence from stimulating and tonic medicines, would render the use of the puccoon very precarious, but after sufficient evacuations have been made or in chronic cases, it will be found a medicine of great value.

IN the western parts of this state, I have been told, a decoction of it has been used with great advantage, and from the very commencement of the complaint. Probably it was given in such quantities as to prove emetic, or produce a deter-

* Mr. William Bartram.

kled over the ulcers, and then covered with a little common cerate, in which some of the powder was also incorporated. The discharge, by this treatment, was much amended; the callos edges were rendered much softer, and the ulcers in general acquired a healthy appearance. It may be proper to observe, that these changes were effected by only a few applications of it: possibly, if the use of it had been continued for some length of time, a cicatrization might have taken place.

THE juice of the root has been mentioned as a cure for warts, and against the bite of some particular kinds of snakes. Whether it is entitled to any notice as such, I will not pretend to say.

WITH this I conclude my essay, conscious of its many imperfections, and that little has been done by me, though a subject of great importance, and claiming the attention of physicians, as also artists. I cannot, however, take leave of this University, without returning my sincere acknowledgments to the different Professors, for the much useful information I have received from them; but in a more particular manner to Professors Barton and Wistar, for their friendly attention and kindness to me.

THE END.

T R A V E L S

T H R O U G H T H E

I N T E R I O R P A R T S

O F

NORTH-AMERICA,

I N T H E

YEARS 1766, 1767, and 1768.

By J. C A R V E R, Esq.

CAPTAIN OF A COMPANY OF PROVINCIAL
TROOPS DURING THE LATE
WAR WITH FRANCE.

ILLUSTRATED WITH COPPER PLATES.

L O N D O N :

PRINTED FOR THE AUTHOR ;

And Sold by J. WALTER, at Charing-cross, and
S. CROWDER, in Pater-noster Row.

M D C C L X X V I I I .

T O

JOSEPH BANKS, Esq. F.R.S.

S I R,

WHEN the Public are informed that I have long had the Honour of your Acquaintance—that my Design in publishing the following Work has received your Sanction—that the Composition of it has stood the Test of your Judgment—and that it is by your Permission a Name so deservedly eminent in the Literary World is prefixed to it, I need not be apprehensive of its Success; as
your

D E D I C A T I O N.

your Patronage will unquestionably give them Assurance of its Merit.

For this public Testimony of your Favour, in which I pride myself, accept, Sir, my most grateful Acknowledgments; and believe me to be with great Respect,

Your obedient

humble Servant,

LONDON,
June 20, 1778,

J. CARVER.

[TRAVELS THROUGH THE INTERIOR PARTS
OF NORTH-AMERICA, IN THE YEARS
1766, 1767, AND 1768.]

CHAP. XIX.

*Of the TREES, SHRUBS, ROOTS, HERBS,
FLOWERS, &c.*

I SHALL here observe the same method that I have pursued in the preceding chapter, and having given a list of the trees, &c. which are natives of the interior parts of North America, particularize such only as differ from the produce of other countries, or being little known, have not been described.

OF TREES.

The Oak, the Pine Tree, the Maple,
the Ash, the Hemlock, the Bass or
White Wood, the Cedar, the Elm, the
Birch, the Fir, the Locust Tree, the
Poplar, the Wickopic or Suckwic, the
Spruce,

Spruce, the Hornbeam, and the Button Wood Tree.

The OAK. There are several sorts of oaks in these parts; the black, the white, the red, the yellow, the grey, the swamp oak, and the chesnut oak: the five former vary but little in their external appearance, the shape of the leaves, and the colour of the bark being so much alike, that they are scarcely distinguishable; but the body of the tree when sawed discovers the variation, which chiefly consists in the colour of the wood, they being all very hard and proper for building. The swamp oak differs materially from the others both in the shape of the leaf, which is smaller, and in the bark, which is smoother; and likewise as it grows only in a moist gravelly soil. It is esteemed the toughest of all woods, being so strong yet pliable, that it is often made use of instead of whalebone, and is equally serviceable. The chesnut oak also is greatly different from the others, particularly in the shape of the leaf, which much resembles that of the chesnut tree, and for this reason it is so denominated.

nominated. It is neither so strong as the former species, or so tough as the latter, but is of a nature proper to be split into rails for fences, in which state it will endure a considerable time.

The PINE TREE. That species of the pine tree peculiar to this part of the continent is the white, the quality of which I need not describe, as the timber of it is so well known under the name of deals. It grows here in great plenty, to an amazing height and size, and yields an excellent turpentine, though not in such quantities as those in the northern parts of Europe.

The MAPLE. Of this tree there are two sorts, the hard and the soft, both of which yield a luscious juice, from which the Indians by boiling make very good sugar. The sap of the former is much richer and sweeter than the latter, but the soft produces a greater quantity. The wood of the hard maple is very beautifully veined and curled, and when wrought into cabinets, tables, gunstocks, &c. is greatly valued. That of the soft sort differs in its texture, wanting the variegated grain of the hard; it also
grows

grows more strait and free from branches, and is more easily split. It likewise may be distinguished from the hard, as this grows in meadows and low-lands, that on the hills and up-lands. The leaves are shaped alike, but those of the soft maple are much the largest, and of a deeper green.

The ASH. There are several sorts of this tree in these parts, but that to which I shall confine my description, is the yellow ash, which is only found near the head branches of the Mississippi. This tree grows to an amazing height, and the body of it is so firm and sound, that the French traders who go into that country from Louisiana to purchase furs make of them periaguays. This they do by excavating them with fire, and when they are completed, convey in them the produce of their trade to New Orleans, where they find a good market both for their vessels and cargoes. The wood of this tree greatly resembles that of the common ash, but it might be distinguished from any other tree by its bark; the ross or outside bark being near eight inches thick, and indented with furrows more than six

I i inches

inches deep, which make those that are arrived to a great bulk appear uncommonly rough; and by this peculiarity they may be readily known. The rind or inside bark is of the same thickness as that of other trees, but its colour is a fine bright yellow; insomuch that if it is but slightly handled, it will leave a stain on the fingers, which cannot easily be washed away; and if in the spring you peel off the bark, and touch the sap, which then rises between that and the body of the tree, it will leave so deep a tincture that it will require three or four days to wear it off. Many useful qualities belonging to this tree I doubt not will be discovered in time, besides its proving a valuable acquisition to the dyer.

The HEMLOCK TREE grows in every part of America in a greater or less degree. It is an ever-green of a very large growth, and has leaves somewhat like that of the yew; it is however quite useless, and only an incumbrance to the ground, the wood being of a very coarse grain, and full of wind-shakes or cracks.

The

The BASS or WHITE WOOD is a tree of a middling size, and the whitest and softest wood that grows; when quite dry it swims on the water like a cork; in the settlements the turners make of it bowls, trenchers, and dishes, which wear smooth, and will last a long time; but when applied to any other purpose it is far from durable.

The WICKOPICK or SUCKWICK appears to be a species of the white wood, and is distinguished from it by a peculiar quality in the bark, which when pounded and moistened with a little water, instantly becomes a matter of the consistence and nature of size. With this the Indians pay their canoes, and it greatly exceeds pitch or any other material usually appropriated to that purpose; for besides its adhesive quality, it is of so oily a nature, that the water cannot penetrate through it, and its repelling power abates not for a considerable time.

The BUTTON WOOD is a tree of the largest size, and might be distinguished by its bark, which is quite smooth and prettily mottled. The wood is very proper for the use of cabinet-makers. It is

I i 2 covered

covered with small hard burs which spring from the branches, that appear not unlike buttons, and from these I believe it receives its name.

NUT TREES.

The Butter or Oilnut, the Walnut, the Hazlenut, the Beechnut, the Pecanut, the Chesnut, the Hickory.

The BUTTER or OILNUT. As no mention has been made by any authors of this nut, I shall be the more particular in my account of it. The tree grows in meadows, where the soil is rich and warm. The body of it seldom exceeds a yard in circumference, is full of branches, the twigs of which are short and blunt, and its leaves resemble those of the walnut. The nut has a shell like that fruit, which when ripe is more furrowed, and more easily cracked; it is also much longer and larger than a walnut, and contains a greater quantity of kernel, which is very oily, and of a rich agreeable flavour. I am persuaded that a much purer oil than that
of

of olives, might be extracted from this nut. The inside bark of this tree dyes a good purple; and it is said, varies in its shade, being either darker or lighter according to the month in which it is gathered.

The BEECH NUT. Though this tree grows exactly like that of the same name in Europe, yet it produces nuts equally as good as chesnuts; on which bears, martins, squirrels, partridges, turkies, and many other beasts and birds feed. The nut is contained, whilst growing, in an outside case like that of a chesnut, but not so prickly; and the coat of the inside shell is also smooth like that; only its form is nearly triangular. Vast quantities of them lie scattered about in the woods, and supply with food great numbers of the creatures just mentioned. The leaves, which are white, continue on the trees during the whole winter. A decoction made of them is a certain and expeditious cure for wounds which arise from burning or scalding, as well as a restorative for those members that are nipped by the frost.

The PECANNUT is somewhat of the walnut kind, but rather smaller than a

I i 3 walnut,

walnut, being about the size of a middling acorn, and of an oval form; the shell is easily cracked, and the kernel shaped like that of a walnut. This tree grows chiefly near the Illinois river.

The HICKORY is also of the walnut kind, and bears a fruit nearly like that tree. There are several sorts of them, which vary only in the colour of the wood. Being of a very tough nature, the wood is generally used for the handles of axes, &c. It is also very good fire wood, and as it burns an excellent sugar distills from it.

FRUIT TREES.

I need not to observe that these are all the spontaneous productions of nature, which have never received the advantages of ingrafting, transplanting, or manuring.

The crab apple-tree, the plum-tree, and the cherry-tree.

The CRAB APPLE-TREE bears a
fruit

fruit that is much larger and better flavoured than those of Europe.

The PLUM-TREE. There are two sorts of plums in this country, one a large sort of a purple cast on one side, and red on the reverse, the second totally green, and much smaller. Both these are of a good flavour, and are greatly esteemed by the Indians, whose taste is not refined, but who are satisfied with the productions of nature in their unimproved state.

The CHERRY-TREE. There are three sorts of cherries in this country, the black, the red, and the sand cherry; the two latter may with more propriety be ranked among the shrubs, as the bush that bears the sand cherries almost creeps along the ground, and the other rises not above eight or ten feet in height; however I shall give an account of them all in this place. The black cherries are about the size of a currant, and hang in clusters like grapes; the trees which bear them being very fruitful, they are generally loaded, but the fruit is not good to eat, however they give an agreeable flavour to brandy, and turn it to the colour of claret.

ret. The red cherries grow in the greatest profusion, and hang in bunches like the black sort just described; so that the bushes which bear them appear at a distance like solid bodies of red matter. Some people admire this fruit, but they partake of the nature and taste of alum, leaving a disagreeable roughness in the throat, and being very astringent. As I have already described the sand cherries, which greatly exceed the two other sorts both in flavor and size, I shall give no further description of them. The wood of the black cherry-tree is very useful, and works well into cabinet ware.

SHRUBS.

The Willow, Shin Wood, Shumack, Sassafras, the Prickly Ash, Moose Wood, Spoon Wood, Large Elder, Dwarf Elder, Poisonous Elder, Juniper, Shrub Oak, Sweet Fern, the Laurel, the Witch Hazel, the Myrtle, Winter Green, the Fever Bush, the Cranberry Bush, the Goosberry Bush, the Currant Bush, the Whirtle

tle Berry, the Raspberry, the Black Berry, and the Choak Berry.

The WILLOW. There are several species of the willow, the most remarkable of which is a small sort that grows on the banks of the Mississippi, and some other places adjacent. The bark of this shrub supplies the beaver with its winter food; and where the water has washed the soil from its roots, they appear to consist of fibres interwoven together like thread, the colour of which is of an inexpressibly fine scarlet; with this the Indians tinge many of the ornamental parts of their dress.

SHIN WOOD. This extraordinary shrub grows in the forests, and rising like a vine, runs near the ground for six or eight feet, and then takes root again; in the same manner taking root, and springing up successively, one stalk covers a large space; this proves very troublesome to the hasty traveller, by striking against his shins, and entangling his legs; from which it has acquired its name.

The SASSAFRAS is a wood well known for its medicinal qualities. It
might

might with equal propriety be termed a tree as a shrub, as it sometimes grows thirty feet high; but in general it does not reach higher than those of the shrub kind. The leaves, which yield an agreeable fragrance, are large and nearly separated into three divisions. It bears a reddish brown berry of the size and shape of Pimento, and which is sometimes used in the colonies as a substitute for that spice. The bark or roots of this tree is infinitely superior to the wood for its use in medicine, and I am surprised it is so seldom to be met with, as its efficacy is so much greater.

The PRICKLY ASH is a shrub that sometimes grows to the height of ten or fifteen feet, and has a leaf exactly resembling that of an ash, but it receives the epithet to its name from the abundance of short thorns with which every branch is covered, and which renders it very troublesome to those who pass through the spot where they grow thick. It also bears a scarlet berry, which when ripe, has a fiery taste like pepper. The bark of this tree, particularly the bark of the roots, is highly esteemed by the natives for its
medi-

medicinal qualities. I have already mentioned one instance of its efficacy, and there is no doubt but that the decoction of it will expeditiously and radically remove all impurities of the blood.

The MOOSE WOOD grows about four feet high, and is very full of branches; but what renders it worth notice is its bark, which is of so strong and pliable a texture, that being peeled off at any season, and twisted, makes equally as good cordage as hemp.

The SPOON WOOD is a species of the laurel, and the wood when sawed resembles box wood.

The ALDER or ELDER, termed the poisonous elder, nearly resembles the other sorts in its leaves and branches, but it grows much straiter, and is only found in swamps and moist soils. This shrub is endowed with a very extraordinary quality, that renders it poisonous to some constitutions, which it effects if the person only approaches within a few yards of it, whilst others may even chew the leaves or the rind without receiving the least detriment from them: the poison however is not mortal, though it operates
very

very violently on the infected person, whose body and head swell to an amazing size, and are covered with eruptions, that at their height resemble the confluent small-pox. As it grows also in many of the provinces, the inhabitants cure its venom by drinking saffron tea, and anointing the external parts with a mixture composed of cream and marsh mallows.

The SHRUB OAK is exactly similar to the oak tree, both in its wood and leaves, and like that it bears an acorn, but it never rises from the ground above four or five feet, growing crooked and knotty. It is found chiefly on a dry gravelly soil.

The WITCH HAZLE grows very bushy, about ten feet high, and is covered early in May with numerous white blossoms. When this shrub is in bloom, the Indians esteem it a further indication that the frost is entirely gone, and that they might sow their corn. It has been said, that it is possessed of the power of attracting gold or silver, and that twigs of it are made use of to discover where the veins of these metals lie hid; but I am apprehensive that this is only a fallacious

cious story, and not to be depended on; however that supposition has given it the name of witch hazle.

The MYRTLE is a shrub about four or five feet high, the leaves of which are larger than those of the common myrtle, but they smell exactly alike. It bears small berries, which are generally called Bay Berries, and these are full of a gluey substance, which being boiled in water, swims on the surface of it, and becomes a kind of green wax; this is not so valuable as bees-wax, being of a more brittle nature, but mixed with it makes a good candle, which as it burns sends forth an agreeable scent.

WINTER GREEN. This is an ever-green of the species of the myrtle, and is found on dry heaths; the flowers of it are white, and in the form of a rose, but not larger than a silver penny; in the winter it is full of red berries about the size of a sloe, which are smooth and round; these are preserved during the severe season by the snow, and are at that time in the highest perfection. The Indians eat these berries, esteeming them very balsamic, and invigorating to the stomach.

stomach. The people inhabiting the interior colonies steep both the sprigs and berries in beer, and use it as a diet-drink for cleansing the blood from scorbutick disorders.

The FEVER BUSH grows about five or six feet high; its leaf is like that of a lilach, and it bears a reddish berry of a spicy flavour. The stalks of it are excessively brittle. A decoction of the buds or wood is an excellent febrifuge, and from this valuable property it receives its name. It is an ancient Indian remedy for all inflammatory complaints, and likewise much esteemed on the same account by the inhabitants of the interior parts of the colonies.

The CRANBERRY BUSH. Though the fruit of this bush greatly resembles in size and appearance that of the common sort, which grows on a small vine in morasses and bogs, yet the bush runs to the height of ten or twelve feet; but it is very rarely to be met with. As the meadow cranberry, being of a local growth, and flourishing only in morasses, cannot be transplanted or cultivated, the former, if removed at a proper season, would

would be a valuable acquisition to the garden, and with proper nurture prove equally as good, if not better.

THE CHOAK BERRY. The shrub thus termed by the natives grows about five or six feet high, and bears a berry about the size of a sloe, of a jet black, which contains several small seeds within the pulp. The juice of this fruit, though not of a disagreeable flavour, is extremely tart, and leaves a roughness in the mouth and throat when eaten, that has gained it the name of choak berry.

ROOTS and PLANTS.

Elecampane, Spikenard, Angelica, Sarsaparilla, Ginseng, Ground Nuts, Wild Potatoes, Liquorice, Snake Root, Gold Thread, Solomon's Seal, Devil's Bit, Blood Root, Onions, Garlick, Wild Parsnips, Mandrakes, Hellebore White and Black.

SPIKENARD, vulgarly called in the colonies Petty-Morrell. This plant appears to be exactly the same as the Asiatic

tick spikenard, so much valued by the ancients. It grows near the sides of brooks in rocky places, and its stem, which is about the size of a goose quill, springs up like that of angelica, reaching about a foot and a half from the ground. It bears bunches of berries in all respects like those of the elder, only rather larger. These are of such a balsamic nature, that when infused in spirits, they make a most palatable and reviving cordial.

SARSAPARILLA. The root of this plant, which is the most estimable part of it, is about the size of a goose quill, and runs in different directions, twined and crooked, to a great length in the ground; from the principal stem of it springs many smaller fibres, all of which are tough and flexible. From the root immediately shoots a stalk about a foot and half long which at the top branches into three stems; each of these has three leaves, much of the shape and size of a walnut leaf; and from the fork of each of the three stems grows a bunch of bluish white flowers, resembling those of the spikenard. The bark of the roots, which alone should be used in medicine, is of a bitterish flavour,

vour, but aromatic. It is deservedly esteemed for its medicinal virtues, being a gentle sudorific, and very powerful in attenuating the blood when impeded by gross humours.

GINSANG is a root that was once supposed to grow only in Korea, from whence it was usually exported to Japan, and by that means found its way to Europe; but it has lately been discovered to be also a native of North America, where it grows to as great perfection and is equally valuable. Its root is like a small carrot; but not so taper at the end; it is sometimes divided into two or more branches, in all other respects it resembles sarsaparilla in its growth. The taste of the root is bitterish. In the eastern parts of Asia it bears a great price, being there considered as a panacea, and is the last refuge of the inhabitants in all disorders. When chewed it certainly is a great strengthener of the stomach.

GOLD THREAD. This is a plant of the small vine kind, which grows in swampy places, and lies on the ground. The roots spread themselves just under the surface of the morass, and are easily

K k drawn

drawn up by handfuls. They resemble a large entangled skain of thread of a fine bright gold colour; and I am persuaded would yield a beautiful and permanent yellow dye. It is also greatly esteemed both by the Indians and colonists as a remedy for any soreness in the mouth, but the taste of it is exquisitely bitter.

SOLOMON'S SEAL is a plant that grows on the sides of rivers, and in rich meadow land. It rises in the whole to about three feet high, the stalks being two feet, when the leaves begin to spread themselves and reach a foot further. Every fibre of the root has an impression upon it about the size of a sixpence, which appears as if it was made by a seal, and from these it receives its name. It is greatly valued on account of its being a fine purifier of the blood.

DEVIL'S BIT is another wild plant, which grows in the fields and receives its name from a print that seems to be made by teeth in the roots. The Indians say that this was once an universal remedy for every disorder that human nature is incident to; but some of the evil spirits

spirits envying mankind the possession of so efficacious a medicine gave the root a bite, which deprived it of a great part of its virtue.

BLOOD ROOT. A sort of plantain that springs out of the ground in six or seven long rough leaves, the veins of which are red; the root of it is like a small carrot both in colour and appearance; when broken, the inside of it is of a deeper colour than the outside, and distils several drops of juice that look like blood. This is a strong emetic, but a very dangerous one.

HERBS.

Balm, Nettles, Cinque Foil, Eye-bright, Sanicle, Plantain, Rattle Snake Plantain, Poor Robin's Plantain, Toad Plantain, Maiden Hair, Wild Dock, Rock Liverwort, Noble Liverwort, Bloodwort, Wild Beans, Ground Ivy, Water Cresses, Yarrow, May Weed, Gargit, Skunk Cabbage or Poke, Wake Robin, Betony, Scabious, Mullen, Wild Pease, Mouse Ear, Wild Indigo, and Cat Mint.

K k 2 SANICLE

SANICLE has a root which is thick towards the upper part, and full of small fibres below; the leaves of it are broad, roundish, hard, smooth, and of a fine shining green; a stalk rises from these to the height of a foot, which is quite smooth and free from knots, and on the top of it are several small flowers of a reddish white, shaped like a wild rose. A tea made of the root is vulnerary and balsamick.

RATTLE SNAKE PLANTAIN.
This useful herb is of the plaintain kind, and its leaves, which spread themselves on the ground, are about one inch and half wide, and five inches long; from the centre of these arises a small stalk nearly six inches long, which bears a little white flower; the root is about the size of a goose quill, and much bent and divided into several branches. The leaves of this herb are more efficacious than any other part of it for the bite of the reptile from which it receives its name; and being chewed and applied immediately to the wound, and some of the juice swallowed, seldom fails of averting every dangerous symptom. So convinced are the Indians
of

of the power of this infallible antidote, that for a trifling bribe of spirituous liquor, they will at any time permit a rattlesnake to drive his fangs into their flesh. It is to be remarked that during those months in which the bite of these creatures is most venomous, that this remedy for it is in its greatest perfection, and most luxuriant in its growth.

POOR ROBIN'S PLANTAIN is of the same species as the last, but more diminutive in every respect; it receives its name from its size, and the poor land on which it grows. It is a good medicinal herb, and often administered with success in fevers and internal weakness.

TOAD PLANTAIN resembles the common plantain, only it grows much ranker, and is thus denominated because toads love to harbour under it.

ROCK LIVERWORT is a sort of liverwort that grows on rocks, and is of the nature of kelp or moss. It is esteemed as an excellent remedy against declines.

GARGIT or SKOKE is a large kind of weed, the leaves of which are about six inches long, and two inches and half broad; they resemble those of spinage in

K k 3 their

their colour and texture, but not in shape. Their root is very large, from which spring different stalks that run eight or ten feet high, and are full of red berries; these hang in clusters in the month of September, and are generally called pigeon berries, as those birds then feed on them. When the leaves first spring from the ground, after being boiled, they are a nutritious and wholesome vegetable, but when they are grown nearly to their full size, they acquire a poisonous quality. The roots applied to the hands and feet of a person afflicted with a fever, prove a very powerful absorbent.

SKUNK CABBAGE or POKE is an herb that grows in moist and swampy places. The leaves of it are about a foot long, and six inches broad, nearly oval, but rather pointed. The roots are composed of great numbers of fibres, a lotion of which is made use of by the people in the colonies for the cure of the itch. There issues a strong musky smell from this herb, something like the animal of the same name before described, and on that account it is so termed.

WAKE

WAKE ROBIN is an herb that grows in swampy lands; its root resembles a small turnip, and if tasted will greatly inflame the tongue, and immediately convert it from its natural shape, into a round hard substance; in which state it will continue for some time, and during this no other part of the mouth will be affected. But when dried, it loses its astringent quality, and becomes beneficial to mankind, for if grated into cold water, and taken internally, it is very good for all complaints of the bowels.

WILD INDIGO is an herb of the same species as that from whence Indigo is made in the southern colonies. It grows in one stalk to the height of five or six inches from the ground, when it divides into many branches, from which issue a great number of small hard bluish leaves, that spread to a great breadth, and among these it bears a yellow flower; the juice of it has a very disagreeable scent.

CAT MINT has a woody root, divided into several branches, and it sends forth a stalk about three feet high; the leaves are like those of the nettle or betony, and they have a strong smell of

K k 4 mint,

mint, with a biting acrid taste; the flowers grow on the tops of the branches, and are of a faint purple or whitish colour. It is called cat mint, because it is said, that cats have an antipathy to it, and will not let it grow. It has nearly the virtues of common mint.

FLOWERS.

Heart's Ease, Lilies red and yellow, Pond Lilies, Cowslips, May Flowers, Jessamine, Honeysuckles, Rock Honeysuckles, Roses red and white, Wild Hollyhock, Wild Pinks, Golden Rod.

I shall not enter into a minute description of the flowers above-recited, but only just observe, that they much resemble those of the same name which grow in Europe, and are as beautiful in colour, and as perfect in odour, as they can be supposed to be in their wild uncultivated state.

FARI-

FARINACEOUS and LEGUMINOUS
ROOTS, &c.

Maize or Indian Corn, Wild Rice,
Beans, the Squash, &c.

MAIZE or INDIAN CORN grows to the height of about five or six feet, on a stalk full of joints, which is stiff and solid, and when green, abounding with a sweet juice. The leaves are like those of the reed, about two feet in length, and three or four inches broad. The flowers which are produced at some distance from the fruit on the same plant, grow like the ears of oats, and are sometimes white, yellow, or of a purple colour. The seeds are as large as peas, and like them quite naked and smooth, but of a roundish surface, rather compressed. One spike generally consists of about six hundred grains, which are placed closely together in rows to the number of eight or ten, and sometimes twelve. This corn is very wholesome, easy of digestion, and yields as good nourishment as any other sort.

sort. After the Indians have reduced it into meal by pounding it, they make cakes of it and bake them before the fire. I have already mentioned that some nations eat it in cakes before it is ripe, in which state it is very agreeable to the palate and extremely nutritive.

WILD RICE. This grain, which grows in the greatest plenty throughout the interior parts of North America, is the most valuable of all the spontaneous productions of that country. Exclusive of its utility, as a supply of food for those of the human species who inhabit this part of the continent, and obtained without any other trouble than that of gathering it in, the sweetness and nutritious quality of it attracts an infinite number of wild fowl of every kind, which flock from distant climes to enjoy this rare repast; and by it become inexpressibly fat and delicious. In future periods it will be of great service to the infant colonies, as it will afford them a present support, until in the course of cultivation other supplies may be produced; whereas in those realms which are not furnished with this bounteous
gift

gift of nature, even if the climate is temperate and the soil good, the first settlers are often exposed to great hardships from the want of an immediate resource for necessary food. This useful grain grows in the water where it is about two feet deep, and where it finds a rich muddy soil. The stalks of it, and the branches or ears that bear the seed, resemble oats both in their appearance and manner of growing. The stalks are full of joints, and rise more than eight feet above the water. The natives gather the grain in the following manner: nearly about the time that it begins to turn from its milky state and to ripen, they run their canoes into the midst of it, and tying bunches of it together just below the ears with bark, leave it in this situation three or four weeks longer, till it is perfectly ripe. About the latter end of September they return to the river, when each family having its separate allotment, and being able to distinguish their own property by the manner of fastening the sheaves, gather in the portion that belongs to them. This they do by placing their canoes close to the bunches of rice,
in

in such position as to receive the grain when it falls, and then beat it out, with pieces of wood formed for that purpose. Having done this, they dry it with smoke, and afterwards tread or rub off the outside husk; when it is fit for use they put it into the skins of fawns or young buffalos taken off nearly whole for this purpose and sewed into a sort of sack, wherein they preserve it till the return of their harvest. It has been the subject of much speculation why this spontaneous grain is not found in any other regions of America, or in those countries situated in the same parallels of latitude, where the waters are as apparently adapted for its growth as in the climates I treat of. As for instance, none of the countries that lie to the south and east of the great lakes, even from the provinces north of the Carolinas to the extremities of Labradore, produce any of this grain. It is true I found great quantities of it in the watered lands near Detroit, between Lake Huron and Lake Erié, but on enquiry I learned that it never arrived nearer to maturity than just to blossom; after which it appeared blighted, and died

died away. This convinces me that the northwest wind, as I have before hinted, is much more powerful in these than in the interior parts; and that it is more inimical to the fruits of the earth, after it has passed over the lakes and become united with the wind which joins it from the frozen regions of the north, than it is farther to the westward.

BEANS. These are nearly of the same shape as the European beans, but are not much larger than the smallest size of them. They are boiled by the Indians and eaten chiefly with bear's flesh.

The SQUASH. They have also several species of the **MELON** or **PUMPKIN**, which by some are called Squashes, and which serve many nations partly as a substitute for bread. Of these there is the round, the crane-neck, the small flat, and the large oblong Squash. The smaller sorts being boiled, are eaten during the summer as vegetables; and are all of a pleasing flavor. The crane-neck, which greatly excels all the others, are usually hung up for a winter's store,
and

and in this manner might be preserved for several months.

I am sensible that I have not treated the foregoing Account of the natural productions of the interior parts of North America with the precision of a naturalist. I have neither enumerated the whole of the trees, shrubs, plants, herbs, &c. that it produces, nor have I divided them into classes according to their different genera after the Linnæan method: the limits of my Work, in its present state, would not permit me to pursue the Subject more copiously. However, if the favour of the Public should render a future edition necessary, as I trust, from the number of Subscribers who have already favoured me with their Names, will be the case, I then propose to enlarge it considerably, and to insert many interesting particulars and descriptions, which the size of the present Edition obliges me to curtail or entirely to omit.

A P P E N -

ANTONII STORCK,

SAC. CÆS. REG. APOST. MAJEST. CONSILIARII AULICI, ARCHLATRI, IN NOSOCOMIO CIVICO PASMARIANO PHYSICI, ET PLURIUM SOCIETATUM MEMBRI &c.

LIBELLUS

DE

USU MEDICO
PULSATILLÆ
NIGRICANTIS.



VINDOBONÆ,

TPIS JOAN. THOM. NOB. DE TRATTNERN,
CÆS. REG. AULÆ TYPOGR. ET BIBLIOP.

MDCCLXXI.

SECRET



PRÆFATIO.

Quamvis Pulsatilla nigricans nullum huc usque locum inter herbas officinales obtineat, eam tamen ad illas jure merito pertinere, experimenta, in hoc libello recensita, evincunt.

His enim comprobatur: Pulsatillum nigricantem esse remedium maxime innocuum, eamque tuto posse ægrotantibus exhiberi & prodesse plurimum in morbis pertinacissimis.

Utinam primævi medicinæ parentes, & primi rei Herbariæ Scriptores tot plantis nomen veneni non imposuissent! Nam inde contigit, ut omnes fere medici, ad nostra usque sæcula, harum usum sollicite evitaverint, & partem medicinæ maxime necessariam neglexerint, relinquerintque incultam.

Venena terrent ægros & inscios, cur autem medicos terreant, ignoro.

Ego profecto! mihi persuasum habeo, in prudentis medici manu nullum dari venenum; Etenim is, ratione & experientia edoctus, debet novisse methodum, qua parentur, dosimque, qua exhibeantur medicamenta efficacia; debet præterea novisse morbum, in quo recte conveniunt & conferunt, & symptomata, quæ similia remedia exposcunt; debet etiam novisse tempus & stadium morbi, in quo indicantur.

His

His cognitis medicus certo errare nunquam potest, nec noxam adferre ægrotanti.

Pulsatilla nigricans videtur magnam virtutem, morbos oculorum antiquos curandi, possidere.

Ejus usu multi visum, jam a pluribus annis deperditum, recuperarunt; aliis levamen adtulit, morbum vero integre vincere non potuit; pauci erant, in quibus nullam prorsus mutationem produxit; nemini autem nocuit.

*Pluribus quidem experimentis rem ad majorem perfectionis gradum deducere potuissem, sed appropinquat tempus vernale, quo illico hæc planta sese extollit, & floret; hinc credidi, congruum esse & utile ejus virtutem nunc manifestare & annunciare medicis, ut debito tempore copiam colligere, & in usus medicinæ parare possint, & egen-
tibus recta methodo exhibere.*

Ad mea experimenta sua contulerunt, Ferdinandus Leber Chirurgiæ professor; Dominus Faucken physicus ad Sanctum Marcum, & Dominus Rechberger chirurgus in eodem magno Nosocomio ad Sanctum Marcum.



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PULSATILLA
NIGRICANTE.

Pulsatilla nigricans. Off.

Anemone pratensis. Linn. Syst. nat. T. 2. Pag. 375.
Edit. ult.

Anemone pratensis. Jacquin. Enum. Stirp. Vindob.
Pag. 97.

Pulsatilla flore minore nigricante. Bauh. pin. 177.

Pulsatilla flore clauso. Lob. ic. p. 283.

Pulsatilla secunda. Boerh. ind. plant. 2. p. 1. pag. 39.

Gall Coquelourde noiratre. *Angl.* Blackish Anemone or Wind-Flower. *Bat.* Keuken-Schelle.

Germ. Schwärzliche Rükenschele ; schwärzliche Windblume

DESCRIPTIO PLANTÆ.



*R*adix est oblonga, rugosa, inæqualiter crassa, perennis, fibrosa; hæc primo vere emittit *Folia* solummodo radicalia bipinnata, *foliolis*

conserta angustioribus, elongatis, acuminatis, inæqualiter divisis, obscure virentibus. Antequam *foliola* penitus evolvantur, exsurgit *caulis* unus alterve teres, exfusco viridis, cinctus *Involucro* nonophyllo, profunde multoties ac inæqualiter diviso, externe subfusco, interne obscure viridi; pars *caulis*, quæ supra involucrum eminet, *Florem* gerit nudum, hexapetalum, fere clausum, coloris saturatoris & quasi nigricantis! fundum floris *stamina* occupant *filamentis* numerosis, flavis, capillaribus, *corolla* dimidio brevioribus, *antheris* didymis, erectis; *Germina* in capitulum collecta *stylis* acuminatis, saturate purpureis terminantur, & in *semina* abeunt acuminata, longiori cauda, pilosa, ornata.

Crescit hæc planta passim in locis apricis; floret mense Aprili.

Omnes ejus partes, paululum masticatæ, linguæ acerrimum, urentem, & diu per-

persistentem saporem imprimunt; sola radix mitior est.

Datur adhuc alia *Pulsatillæ* species, quæ *Pulsatilla vulgaris* dicitur, seu *Anemone Pulsatilla Linnæi*: hæc ob copiosam, densamque pubem, qua undique large tegitur, quasi ex viridi canescit; *Foliola* habet latiora; *Florem* gerit majorem, erectum, magis apertum, pallide violaceum: cæterum omnes plantæ partes, etiam diutius masticatæ, acres non sunt, & linguam sapore nauseoso ac leviter amaricante afficiunt. Aqua inde destillata vix non insipida est.

Dum hæc *Pulsatilla vulgaris* defloruit, tunc incipit nostra *Pulsatilla nigricans* florere, quam, ut colligentes a priori rite distinguant, & seligant, oro; etenim earum virtutes non videntur esse æquales.

Egregius ac Doctissimus *Jacobus Well* Pharmacopæus, ad ursum nigrum, mihi ex *Pulsatilla nigricante* paravit aquam destillatam & extractum.

Sumsit is plantam totam cum floribus, abjecta tamen radice, conscissam imposuit cucurbitæ vitreæ, & adfudit octo partes aquæ fontanæ, & apposito capitello, adjunctoque excipulo ad balneum arenæ medietatem abstraxit.

Hocque abstractum asservavit sub nomine *aquæ Destillatæ Pulsatillæ nigricantis*, quæ admodum acris & penetrans est.

Reliquum adhuc paulisper decoxit, herbam aliquantulum expressit, percolavit, & colaturam ad extracti mollioris consistentiam lenissimo calore fecit evaporari.

Extractum hocce linguæ impositum in principio leniter adstringere videtur, dein pungentes dolores excitat, & tandem ardorem diu permanentem producit.

Confeci ex hoc extracto binos pulveres; primum, qui leviozem extracti dosim continet, nominavi pulverem *A.*,

se-

secundum vero pulverem *B.*, qui duplam extracti dosim recipit.

℞. Extracti *Pulsatillæ nigricantis* gr. VII.

Sacchari albi dr. i.

m. f. pulv. tenuissimus diu terendo in mortario marmoreo.

℞. Extracti *Pulsatillæ nigricantis* gr. XIV.

Sacchari albi dr. i.

m. f. pulvis tenuissimus diu terendo in mortario marmoreo.

Ex pulvere *A.* assumsi quinque grana mane, & eandem dosim vesperi repetii, idque hac ratione præstiti per triduum; & quoniam nullum in me effectum percepi, sumsi grana decem mane & totidem tempore vespertino.

Ex hac dosi sensi semper aliquot minutis ab assumptione dolorem lancinantem in oculo dextro, in quo magnam contusionem biennio abhinc passus fui; quum effrænes equi currum, cui insidebam, violento concussu invertabant; in reliquo
au-

autem toto corpore nil prorsus incommodi animadverti.

Postquam per quinque dies quotidie grana viginti hujus pulveris deglutivissem, nullamque inde in me functionem turbari, aut lædi observassem, credidi: tuto & omni jure hunc pulverem posse exhiberi ægrotantibus.

Omnem curam parva pulveris *A.* dosi inchoavi, & didici dein experimentis iteratis, ægros ejus magnam quantitatem sensim sine omni molestia & noxa ferre. Aliqui acceperunt per diem unam, duas, tresve Drachmas.

Dum dofis pulveris *A.* ad drachmam mediam vel drachmam integram augebatur, exhibui tunc pulverem *B.*, ut æger sub minori volumine eandem tamen extracti seu medicamenti portionem aquireret.

Ex herba sicca paravi infusum sequenti modo:

Her-

Herbæ *Pulsatillæ nigricantis* dr. i.
consciss. infunde s. q. aq. fervid.
per $\frac{1}{4}$ hor. vase clauso dein colaturæ lib. i.

adde

Sacchari q. s. ad gratiam.

S.umat æger ter quotidie vasculum unum unciarum trium vel quatuor hujus infusi.

Reddidi hoc infusum fortius, dum ad ejusdem colaturæ quantitatem dr. ij. vel dr. iij. vel unc. B. adhibui, idque ægri sine molestia tulerunt.

Hoc infusum interne, & externe applicatum in fædis & sordidis ulceribus optimos quandoque præstitit effectus.

Tentavi id etiam in tinæa capitis antiqua admodum, verum cutis inflammabatur, caput vehementer doluit, unde ab ulteriori experimento abstinendum judicavi.



Ex-

EXPERIMENTA.

EXPERIMENTUM I.

Fœmina, 35. annorum, a quinque annis & dimidio brachium sinistrum non poterat movere; erat enim totum rigidum, & emaciatum.

Causam mali rejecit in morbum rheumaticum, quo olim per totum corpus laboravit, & quo disparente brachium cœpit immobile fieri, & rigescere.

Remedia interna & externa hucusque nil profuerunt; ipsa vis electrica dolorem magnum produxit, sed malum non emendavit.

Huic exhibui mane drachmas duas aquæ destillatæ *Pulsatillæ nigricantis*; eandem dosim vesperi iteravi. Primis binis diebus nullam sensit mutationem.

Unde tertio die suasi, ut sumeret mane unciam dimidiam, & totidem ad meridiem & vesperi.

Per-

Percepit tunc vagos & lancinantes in brachio dolores, & noctu pruritum ingentem.

Post octiduum cœpit digitos paululum movere, & dolores fuerent frequentiores.

Dedi dein ter de die unciam integram hujus aquæ, & jussi, ut mane & vesperi brachium totum probe fricaretur pannis laneis, & dein lavaretur aliquamdiu eadem aqua destillata ex *Pulsatilla nigricante*.

Intra binas septimanas potuit brachium elevari, & digiti movebantur liberius.

Debito tempore rediit fluxus menstruus, sed longe copiosior, ac alias esse solebat.

Quamdiu menstrua fluebant, ægra nec dolorem, nec pruritum sensit in brachio; his autem finientibus novus & valde molestus ortus est pruritus & compa-ruerunt pustulæ rubræ, copiosissimæ, quæ dein pure replebantur.

Dum

Dum primæ pustulæ exsiccatae sunt, & in squammas secesserunt, novæ iterum multæ eruperunt; hoc aliquoties eodem ordine contigit, & ægra semper inde levamen habuit, atque spatio trium fere mensium poterat brachium libere in omnem partem movere, & eo uti ad solitos labores bene peragendos.

Eandem remedii dosim usque ad finem curationis semper assumsit, nec abstinuit, dum menstrua fluebant.

Neque lotio & lenis frictio brachii fuit intermissa, licet pustulæ suppurantes doluerint acriter & cutis superficies fuerit inflammata; quoniam his externe irritatis motus brachii semper factus est melior & liberior. Unde has molestias ægra patienter tulit.

Primis diebus ex usu hujus remedii urina copiose educebatur, & ægra subinde levem vomendi conatum percepit; cæteroquin de nullo incommodo conquesta fuit.

Ex-

EXPERIMENTUM II.

Sacerdoti, 63. annorum, qui paralyysi brachii & pedis dextri jam a decem annis laboravit, dedi mane & vesperi unciam dimidiam aquæ destillatæ *Pulsatillæ nigricantis*; spatio octidui nil mutatum fuit.

Sumsit dein ter de die unciam dimidiam, mox autem nausea ipsum prehendebat & vomendi conatus.

Suasi, ut dosim remedii iterum minueret, verum nec exiguam quantitatem amplius potuit deglutire, quin vomitus moveretur; unde erat ab hoc remedio abstinendum.

EXPERIMENTUM III.

Fœmina, 28. annorum, ante triennium a fœdis venereis ulceribus curata fuit, ab eo autem tempore sensit in omnibus membris & articulis continuos & dilacerantes dolores, qui quotidie ver-

B

sus

sus horam quartam matutinam multa cum vehementia exacerbabantur.

Appetiit quidem, & reliquæ functiones bonæ erant, sed corpus mansit debile & emaciatum.

Quæcumque adhibita remedia nil levaminis adtulerunt, nec juverunt balnea.

Huic dedi mane & vesperi unciam dimidiam aquæ destillatæ *pulsatillæ nigricantis*, quam bene tulit; urina inde copiose fluxit, & primis diebus aliquoties solvebatur alvus.

Sexto die noctu multum sudavit, & sudor male olebat, dolores minuti sunt, & somnus tranquillus usque ad horam sextam matutinam duravit.

Octavo die catamenia prodierunt, quæ solito longe copiosiora erant; nec dolor colicus, qui alias semper ea præcesserat, tunc advertebatur.

Remedium etiam tempore catameniorum fuit continuatum; unde sensim redierunt vires, habitus corporis iterum incre-

crevit, tandem dolores cessarunt, & finita quinta septimana sanitas fuit bona.

EXPERIMENTUM IV.

Vir, 34. annorum, Gonorrhæa venerea neglecta, & inveterata jam diu vexabatur; præterea testiculus dexter durus fuit, & mole longe major sinistro.

Sumsit mane & vesperi unciam dimidiam aquæ destillatæ *Pulsatillæ nigricantis*; primo statim die oriebatur intollerabilis fere ardor urinæ; altero die idem ardor continuavit, & multus ichor fœtidus exstillavit ex urethra.

Tertio die æger in dimittendo urinam tantum sensit dolorem, ut fere in animi deliquium ceciderit; præscripsi tunc saturatum ex herba althæa decoctum, ut copiose id biberet tota die, nec tamen remedii alterius usum interromperet.

Quarto die ardor longe minor fuit, ichoris stillicidium autem adhuc erat copiosius ac die præcedenti.

Quinto die omnia fuerunt mitiora, appetitus bonus, noctes tranquillæ.

Spatio trium septimanarum usu continuo ejusdem remedii & decocti emollientis gonorrhæa fuit integre curata, sed testiculus induratus permansit in eodem statu.

EXPERIMENTUM V.

Vidua, 42. annorum, tophos venereos in osse frontis, ad sternum, & utramque tibiam habuit, & dolores vehementes in omnibus artubus, qui vesperi semper valde exacerbabantur; oculo dextro jam a viginti annis nil vidit, quoniam cornea tota transparens panno erat Obducta; menstruo fluxu jam a binis & dimidio annis caruit.

Exhibui ei mane & vesperi unciam dimidiam aquæ destillatæ *Pulsatillæ nigricantis*, quam sumsit per octiduum sine effectū; id solum sibi observare visa est, lucem se quamdam confusam oculo, quo
jam

jam per viginti annos nil vidit, percipere.

Auxi tunc dosim, & dedi ter quotidie unciam dimidiam ejusdem aquæ.

Post octiduum rediens dixit: dolores nocturnos esse minores, seque posse oculo suo dextro jam colores distinguere.

Examinando tophos, inveni eos in fronte longe minores, molliores; reliqui autem non sunt mutati; pannus in oculo erat tenuis, & hinc inde transparens.

Jussi, ut eadem dosi continuaret; quo contigit, ut spatio trium & dimidii mensium visum in oculo, jam a tot annis obfuscato, recuperaverit, ut dolores nocturni cessarint, disparueruntque topi in fronte; verum reliqui nec mole nec duritie minuebantur; erant tamen absque dolore.

His ægra contenta abstinuit a remedio, ex cujus usu nil insoliti unquam observavit.

EXPERIMENTUM VI.

Ancilla, 26. annorum, tophis vene-
reis valde magnis a quinque mensibus la-
borans in utraque tibia, dolores noctur-
nos enormes patitur, & extenuatur fluo-
re albo.

Tentavi eandem aquam, exhibendo
mane unciam dimidiam, & totidem ve-
speri.

Intra octiduum nil levaminis sensit;
suasi, ut ter de die sumeret unciam di-
midiam; inde videbantur dolores noctur-
ni leviores per aliquot dies; verum pau-
lo post eadem cum violentia redierunt.

Exhibui tunc ejus aquæ unciam inte-
gram mane, ad meridiem, & vesperi, ita
ut quotidie tres uncias deglutiverit; ast
nec inde malum emendatum fuit, licet
per sex septimanas diligenter & magna
cum constantia eam assumserit.

Hinc ut ab hoc remedio abstineret
jussi.

Præ-

Præscripsi dein saturatum florum *Flammulæ Jovis* infusum, ex quo, spatio trium mensium, integre convaluit, pinguis facta est, & nupsit.

EXPERIMENTUM VII.

Ancilla, 14. annorum, in tota facie, collo, & pectore ulcera habuit fœda, & fœtido ichore manantia; in hac tentavi pulverem *A.*, exhibendo mane grana decem, totidem ad meridiem, ac vesperi; ulcera jussi bis quotidie infuso florum sambuci ablui, & dein tegi emplastro diapompholygos.

Primis quatuordecim diebus omnia videbantur mutari in melius; copia ichoris minuebatur, & margines ulcerum futuram cicatricem promittebant.

Verum hæc iterum evanuerunt subito, & ulcera redierunt æque mala, licet ægra quotidie drachmam integram, dein drachmam unam & dimidiam hujus pulveris assumeret per multas septimanas.

Exhibui dein ter quotidie vascula bina saturati infusi *flammulæ Jovis*, & bis quotidie conspersi ulcera pulvere ejusdem plantæ, & texi emplastro diampompholygos; felix inde sequebatur successus; etenim spatio binorum mensium ulcera erant firma cicatrice clausa, & sanitas fuit bona.

EXPERIMENTUM VIII.

Homo, 21. annorum, a pessimis velipenduli & palati ulceribus venereis curatur; manet autem ipsi pertinax admodum ophthalmia, & opacitas in utroque oculo; dextro quidem oculo confuse quædam videre potuit, in sinistro autem albugo visum penitus impedivit.

Parotis dextra jam a longo tempore scirrhusa fuit & magna.

Remedia omnis generis mercurialia, antimonialia, aliaque interna & externa, longo & diligenti usu applicata, nihil juverunt; æger potius inde vires prosterni,

vi-

visum diminui, & appetitum deleri, noctesque inquietas reddi conquerebatur.

Ideo dabantur ipsi grana viginti pulveris *A.* mane & totidem vesperi.

Primis octo diebus magnus in oculis dolor ortus est, & copiosissime plorabant oculi.

Data dein fuit ter quotidie similis dosis ejusdem pulveris, & inde sequebatur multa salivatio, qua prodiit gluten tenacissimum.

Salivatio duravit per aliquot dies, & visus in oculo dextro melior factus est, & ad oculum sinistrum cœpit lumen obscure penetrare.

Cessante salivæ fluxu insurgebat diarrhæa copiosa, fœtidissima; eadem nihilominus dosi & eodem remedio continuavimus, quoniam æger nequaquam debilis reddebatur, & in oculis magnum sentiebat levamen.

Sponte desiit diarrhæa, & tunc caput cœpit vehementer dolere per biduum.

Spatio quinque septimanarum oculo dextro omnia sat bene distinxit, isque fere totus serenus fuit; in sinistro lumen magis percipiebatur, & cœpit manifeste dissipari albugo.

Aucta tunc dosis remedii fuit, exhibendo ter quotidie drachmam dimidiam ejusdem pulveris.

Ex hac dosi iterum novus in oculis dolor sequebatur, & dixit æger: se sentire ac si quis cultro aliquid in oculis abraderet, nec tamen oculi rubebant, lachrymæ multæ exstillarunt, & fluxit urina solito longe frequentior & copiosior.

Post aliquot dies dolores in oculis remiserunt, cœpit emolliri parotis schirrhosa, & finito secundo mense visus iterum melior fuit.

Dedimus tunc ter quotidie drachmam dimidiam pulveris *B.* & hac dosi in quartum mensem pereximus, quo tempore æger utroque oculo bene omnia videre po-

potuit, & simul a parotide scirrhusa integre curatis fuit.

EXPERIMENTUM IX.

Vir, 35. annorum, crurum paralyti, & ingenti ad os sacrum dolore jam a longo tempore laborat; varia & maxime efficacia remedia nil juvant.

Dantur ei grana XV. pulveris *A.* mane & totidem vesperi.

Primis sex diebus dolorem sat acutum in ventre sensit quotiescunque hunc pulverem assumsit, is autem ultra mediam horam nunquam duravit.

Septimo die afficiebatur diarrhæa, & tunc dolores ventris cessarunt.

Postquam per 20. dies usus erat hoc pulvere, percepit dolores arduentes, lancinantes & vagos a digitis pedum ad inguina usque; præterea nil mutatum fuit.

Dedimus tunc grana XX. ejusdem pulveris bis per diem, & inde aucti sunt dolores in cruribus & præsertim in digitis pedum.

Post

Post binas septimanas potuit crura aliquantulum movere, surrexit e lecto, ambulare tamen non poterat.

Exhibebatur tunc bis per diem drachma dimidia pulveris *A.* & dolores in cruribus aucti sunt.

Octiduo post dolores ad os sacrum vehementes adeo fiebant, ut somnum impediverint.

Sumsit tunc ter de die grana XX. pulveris *B.*, & mox haimorrhoides cœperunt copiose fluere per triduum.

Finito haimorrhoidum fluxu dolores ossis sacri evanuerunt, & ii in cruribus multum sunt diminuti.

Dedimus tunc ter quotidie grana XXX. pulveris *B.* qua dosi jam per aliquot septimanas continuat, & dolores in cruribus cessant, æger surgit e lecto, ambulat solus, sed valde adhuc est debilis.

Ex-

EXPERIMENTUM X.

Vir, 48. annorum, ulcera venerea in faucibus & lingua tota habet, quæ remediis antevenereis non solum non cedunt, sed serpunt semper, & vicinas partes magis in latum & profundum corrodunt.

Tentavimus pulverem *A.*, exhibendo ter quotidie grana viginti.

Per quinque dies nullam vidimus in ulceribus mutationem, sed urina ingenti copia profluxit.

Dedimus tunc ter quotidie grana XXX. ejusdem pulveris, & sensim videbantur puriora fieri ulcera.

Demum auximus remedii dosim præbendo ter quotidie grana XXX. pulveris *B.*, & hac dosi æger intra quatuor septimanas integre curatus est.

EXPERIMENTUM XI.

Homo, 30. annorum, ex apertis tumoribus Lymphaticis ulcera habuit magna

gna ad scapulam sinistram, & ad cubitum brachii dextri, genu sinistrum tumuit, & erat immobile.

Ulceræ tantam seri copiam fundebant continuo, ut æger cæperit contabescere, licet usus fuerit optimis remediis, & diætâ lactea.

Præ nimio in genu dolore nec pedi insistere, & minus adhuc ambulare potuit.

Exhibuimus ei pulverem *A.*, incipiendo a granis XV. mane, totidem ad meridiem, & vesperi, sensim auximus dosim, donec ter quotidie drachmam integram hujus pulveris absumserit.

Primis diebus sensit dolorem in abdomine ex assumpto pulvere, postea autem nil amplius incommodi percepit, nec ulla alia in corpore mutatio contigit.

Spatio trium mensium ulcera sunt firmiter consolidata, tumor ad genu fuit multum diminutus, rediit quædam in genu nobilitas, æger ambulat, & recuperat vires naturales.

Ex-

EXPERIMENTUM XII.

Ancilla, 24. annorum, ulcus habet fœdissimum in lingua, quo lingua fere tota a basi ad apicem usque bifurcata, & erosa fuit.

Per multos menses laudatissimis usa est remediis; verum nec mali limites poterant coerceri, nec ullum unquam levamen observabatur.

Spatio autem quinque septimanarum ex usu pulveris A. non solum ulcus purum fuit redditum, sed & replebatur pulchra carne, & totum bona cicatrice obducebatur; in apice solummodo levis adhuc excoriatio superest, ad quam destruendam penitus eodem adhuc pulvere parva dosi utitur.

Vires autem habet optimas, & solita servitia omni cum alacritate & constantia peragit.

In principio ex usu pulveris tormina sensit; dein autem sequebatur alvi flu-

xus

xus, qui omnem ventris dolorem sustulit.

Observavit quoque ægra urinam longe copiosius ab hoc pulvere moveri.

Menstrua ipsi redierunt solito tempore, & sub usu pulveris erant longe abundantiora, & per plures dies durarunt.

EXPERIMENTUM XIII.

Fœmina, 34. annorum, ulcere venereo & carie ossis frontis laborat.

Remedia antivenerea diu applicata vix ullum auxilium adferunt.

Pulvis autem *B.* spatio trium mensium cariem destruxit, induxitque firmam & bonam cicatricem.

EXPERIMENTUM XIV.

Ancilla, 25. annorum, gerit a longo tempore tumorem lymphaticum ad articulum genu dextri, qui a perito chirurgo lanceola fuit pertusus, & effluxit multa lymphæ turbida.

Fa-

Facta incisione tumor concidit; verum lymphæ stillicidium continuat, genu dolet multum, & ægra incipit contabescere.

Præter alia remedia sumsit decoctum corticis peruviani cum lacte, & externe applicabatur cataplasma ex herbis resolyentibus, & aqua vegeto-minerali *Gouldardi*; malum autem nequaquam fuit emendatum, & genu iterum magis intumuit.

Datus igitur fuit pulvis *B.*, quo intra paucos dies mitior fiebat dolor in genu, & ægra potuit dormire.

Sensim quoque minuebatur lymphæ stillicidium, genu detumuit, dolores cesarunt.

Tandem spatio binorum mensium consolidatum fuit ulcus, ægra ambulat sine omni dolore, recuperat vires, genu adhuc paulisper tumet.

Sub usu pulveris ægra advertit urinam solito copiosorem cieri, & alvum habuit laxam; præterea nil insoliti observavit.

C

Ex-

EXPERIMENTUM XV.

Ancilla, 17. annorem, fluore albo venereo, condylomatibus ad pudenda, ulceribus faucium & linguæ pessime afficitur.

Consuetis remediis tolluntur condylomata, sistiturque fluor albus; ulcera autem permanent æque sordida, & serpunt continuo.

Datur pulvis A., & spatio unius mensis ulcera omnia sunt optime curata, & rediit robusta sanitas.

Urinam primis diebus abundantius moveri sensit ægra ex usu hujus pulveris, aliud nihil insolidi accidit.

EXPERIMENTUM XVI.

Fœmina, 28. annorum, oculo sinistro jam ab aliquot annis nil videt, nec lumen distinguit, quoniam pannus crassus totam corneam transparentem occupat.

Re-

Remedia interna & externa juvant nihil.

Data ideo fuerunt grana XX. pulveris *A.* mane, totidem circa meridiem, & vesperi.

Primis statim diebus enormes in oculo affecto dolores ægra conquerebatur, quotiescunque hunc pulverem assumsit.

Hi vero sensim mitiores facti sunt, & tandem cessarunt.

Decimo quarto die pannus videbatur tenuior, & ægra lumen optime discernebat a tenebris.

Exhibebantur tunc ter de die grana XV. pulveris *B.*, & hæc dosis ad curationem perficiendam suffecit.

Etenim spatio binorum fere mensium pannus evanuit, ægra eo oculo omnia vidit, & distinxit.

Præter dolores in oculo affecto, quos primis diebus ægra patiebatur, nullam aliam mutationem in corpore suo percepit.

EXPERIMENTUM XVII.

Ancilla, 25. annorum, tophum venereum habuit ad articulum sinistrum maxillæ inferioris; hic in suppurationem abiit, & solitis remediis ulcus, inde ortum, curabatur; remansit tamen quidam tumor, & dolor ingens in parte læsa, & maxillæ motus omnis fere erat impossibilis.

Datur pulvis *A.*, unde in principio dolores augentur, & ægra cogitur fere omni momento urinam dimittere.

Post decem dies maxilla fit mobilior, dolores autem sunt adhuc magni.

Spatio sex septimanarum cessant dolores, tumor evanescit, maxilla liberius movetur, & ægra cibos suos sine molestia masticat, & deglutit.

EXPERIMENTUM XVIII.

Puella, 14. annorum, amaurosi laborat in utroque oculo, & præter lumen confusum nil videt, pupillæ sunt dilatatæ, immobiles.

Dan-

Dantur ter quotidie grana XV. pulveris *A.*, unde sensit in oculis validos dolores.

Decimo quarto die jam quædam videre potuit, & pupillæ erant mobiliore.

Spatio binorum fere mensium visus integer rediit, pupillæ factæ sunt naturales, & optime mobiles.

Hæc puella primis tribus septimanis ex usu hujus pulveris quotidie bis terve purgata fuit, nec tamen se debilem inde sensit; cæteroquin de nulla re conquerbatur.

EXPERIMENTUM XIX.

Puella, 15. annorum, albuginem habet in utroque oculo; videt quidem, sed nec colores nec objecta potest distinguere.

Varia applicata collyria, aliaque penetrantissima ac solventia remedia interne adhibita malum nequaquam emendant.

Demum sumpsit ter de die grana XV. pulveris *A.*, unde in principio magnos in oculis dolores sensit, & levi diarrhæa laboravit, post paucos autem dies cœpit visus emendari, & spatio sex septimanarum omnis albugo disparuit; & oculus dexter fuit perfecte curatus; sinister autem fuit adhuc debilis; hinc pergit in usu ejusdem pulveris, & spes est: fore ut is quoque integrum suum robur recuperet.

EXPERIMENTUM XX.

Fœmina, 39. annorum, a 14. annis, amaurosi laboravit in oculo dextro, & sinister oculus eodem malo afficiebatur a sesquianno.

Misera nil potuit videre, nec diem a nocte discernere, nec sola ambulare.

Postquam multa adhibuisset remedia sine omni effectu, sumpsit tandem pulverem *A.*

Dolores validissimi, dilacerantes, perterebrantes & lancinantes in oculis a principi-

cipio orti sunt, & cœperunt oculi vehementer plorare.

Post tres septimanas proruperunt menses copiosi, qui jam ab aliquot annis retinebantur.

Post sex circiter septimanas cœpit lumen clare distinguere, & pupillæ in utroque oculo fiebant mobiles.

Quinque nunc menses finiti sunt, quibus utitur hoc pulvere, & oculo sinistro objecta videt, colores distinguit, & sola per plateas ambulat; dexter autem oculus male se habet, licet pupilla sit mobilior, & luminis sensus penetret; nullus autem color discernitur, nec figura objecti.

Ulteriori autem usu hujus pulveris speramus hunc quoque oculum bonum futurum, cum jam quædam in melius mutatio observetur.

Ægra autem est quam contentissima, quoniam uno oculo videt, & sola ambulare potest.

Menstruorum fluxus ipsi omni tertia septimana redit; reliquæ corporis actiones sunt quam sanissimæ.

EXPERIMENTUM XXI.

Fœmina, 33. annorum, primis diebus puerperii summis in mamma dextra doloribus afficitur; mamma tumet, dura est, rubet.

Applicatis bonis remediis dolor mammæ cessat, rubedo disparet, durities emollitur, sed mox vehementissimus dolor occupat aurem utramque, & altero die pus effluit ex utroque meatu auditorio, & dolor remittit.

Hic puris fluxus durat per quinque dies, & tunc sponte sistitur.

Triduo post conqueritur ægra de tensione in oculis; dicit sese objecta non rite videre; tandem perit totus visus, & oritur amaurosis in utroque oculo.

Applicata vesicantia ad nucham & post aures, data remedia purgantia, aliaque de-

derivantia, solventia, discutientia &c., nil levaminis adferunt, & malum durat per septem annos.

Nunc sumit per tres & dimidium menses pulverem *A.* & jam sola ambulat, & incipit objecta etiam minora discernere.

In principio magnos in oculis dolores ex usu hujus remedii passa est.

Menstruorum fluxus semper bonus & regularis fuit.

EXPERIMENTUM XXII.

Ancilla, 20, annorum, ante medium annum laboravit ophthalmia inflammatoria in oculo sinistro, quæ in suppurationem abiit.

Pus corneæ laminam anteriorem penetravit, & relinquebatur inde crassa cicatrix, & tota cornea fuit opacata, atque ægra eo oculo nil poterat videre.

Cum incassum tentata fuissent plurima remedia, tandem dabatur pulvis *A.*; cujus uso spatio binorum mensium cornea

serena & pellucida facta est, cicatrix evanuit, & ægra visum integre recuperavit.

Huic ægræ retinebantur menses jam ab integro fere anno, qui mox ab uso hujus pulveris comparuerunt copia bona, & observarunt deinceps semper debitum ordinem, & solitam periodum.

EXERIMENTUM XXIII.

Mulier, 43, annorum, ex partu difficili afficitur amaurosi utriusque oculi, & jam a binis fere annis nil videt.

Exhibetur ei pulvis *A.*, qui in principio ingentes in oculis dolores produxit; spatio autem septem septimanarum tantum boni præstitit, ut ægra jam rite per agat labores domesticos, & sola possit per plateas incedere.

EXPERIMENTUM XXIV.

Mulier, 40. annorum, dextro oculo nil videt, quoniam lens crystallina grisea est, & penitus opaca.

Uti-

Utitur nunc pulvere *A.* per sex septimanas, & lens fit tenuior, & ægra eo oculo jam quædam videt, distinguit.

EXPERIMENTUM XXV.

Juvenis, 22. annorum, visum in utroque oculo adeo debilem habet, ut characteres majoris etiam magnitudinis legere amplius non possit.

Penetrantissima ipsi adhibita sunt remedia sine omni effectum; nunc per sex septimanas sumit pulverem *A.*; & jam comode legit impressos characteres, & reliqua omnia objecta melius videt.

EXPERIMENTUM XXVI.

Vir, 42, annorum, casu fortuito sibi vulnus inflixit in medio corneæ oculi dextri; magna sequebatur inflammatio, quæ repetitis venæ sectionibus, aliisque remediis derivantibus ac antiphlogisticis mitigata fuit, verum mansit fœda cicatrix, & crassa opacitas in tota cornea.

A

A variis varia collyria, aliaque remedia applicabantur; morbus autem semper in pejus mutabatur.

Nunc per tres menses usus est pulvere *A.*, & vix amplius cicatricis minimum vestigium superest, cornea tota optime pellucet, & oculus objecta perfecte videt.

EXPERIMENTUM XXVII.

Puer, 8. annorum, ante binos annos variolis laboravit, & his superatis oriebatur inflammatio in utroque oculo, qua disparente remansit opacitas in tota cornea oculi dextri, & sensim formabatur pannus crassus; in oculo sinistro observatæ sunt variæ maculæ albæ, quæ visum turbarunt.

Spatio binorum & dimidii mensium usu pulveris *A.*, oculi ambo perfecte sunt curati.

Ex-

EXPERIMENTUM XXVIII.

Juvenis, 22. annorum, a septem mensibus gerit testiculum dextrum induratum, & magnum ex gonorrhæa, remediis adstringentibus suppressa.

Tentavimus pulverem A., & spatio binorum mensium testiculus ad statum naturalem fuit redactus.

EXPERIMENTUM XXIX.

In viro, 31. annorum, eodem morbo laborante eundem pulverem adhibuimus longo tempore, verum nulla fiebat mutatio.

EXPERIMENTUM XXX.

Vir, 24. annorum, pertæsus diuturnæ gonorrhææ, parat sibi injectiones ex remediis saturninis, quibus virulentæ materiei fluxus sistitur; & urinæ ardor cessat

Se tunc cito curatum gloriabatur, & gaudebat; verum post duodecim circiter dies

dies dolorem obtusum sensit in testiculo dextro, & eum tangendo observat esse multo majorem, & durum valde.

Sumsit remedia purgantia & mercurialia, sed sine effectu per aliquot septimanas.

Tandem me accessit, & re bene examinata adhibui pulverem *A.*, ex cujus usu spatio binorum mensium magnum levamen sensit; etenim testiculus mollis factus est, & multo minor; & tunc se jam curatum putavit, & ab ulteriori usu remedii abstinuit.

Contigit postea, ut iterum præter causam sibi cognitam idem testiculus valde intumuerit, durus admodum evaserit, & cœperit multum dolere.

Unde anxius rediit, & novam pulveris dosim efflagitavit.

Dedi tunc purgans ex granis *XL.* *Jalap.* & totidem granis cremoris tartari; & altero die præbui grana *XX.* pulveris *B.*

ma-

mane, eandem dosin iteravi ad meridiem, & vesperi.

Hac ratione, diligenter continuando, spatio novem septimanarum perfecte convaleuit æger; testiculus naturalem magnitudinem, mollitiem, & figuram iterum obtinuit.

EXPERIMENTUM XXXI.

Homo, 29. annorum, pannum crassum jam a 23. annis habet in oculo sinistro supra totam corneam transparentem.

Hoc malum ex variolis confluentibus originem derivavit.

Pulvis *B.* intra paucos dies manifestam induxit mutationem; pannus hinc inde tenuior & transparens fiebat, & æger cœpit lumen bene distinguere.

Mensis spatio pannus evanuit, & relinquebatur solummodo in latere sinistro levis nubecula; quæ sensim quoque difflatur.

Sta-

Statim in principio dedi huic ægro ter quotidie scrupulum unum pulveris *B.*, nec amplius dosim auxi.

EXPERIMENTUM XXXII.

Fœmina, 50. annorum, ab aliquot annis laborat in oculo dextro amaurosi, & in sinistro habet cataractam.

Nunc in tertium mensem utitur pulvere *A.* & iris in oculo dextro fit mobilis, & cataracta jam videtur multo tenuior, sed ægra nullam adhuc lucem percipit.

EXERIMENTUM XXXIII.

Vir, 40. annorum, ex morbo acuto, gravi admodum, visum in utroque oculo sensim amisit; in dextro orta est amaurosis, & in sinistro glaucoma.

Per aliquot annos utebatur variis remediis, sed a nullo sensit in oculis levamen.

Per binos menses nunc sumit pulverem *A.*, & glaucoma minuitur, iris in
ocu-

oculo amaurotico mobilis fit, & æger candelam vespertino tempore lucentem distinguit.

EXERIMENTUM XXXIV.

Puer, 6. annorum, oculo dextro fere nihil videt, quoniam is totus est opacus, & turbidus ex morbo varioloso, quem biennio abhinc passus est.

Sumsit nunc pulverem *A.* per binos & dimidium menses, & oculus est serenus, & visus bonus.

EXERIMENTUM XXXV.

Puella, 9. annorum, ad depellendam oculi dextri inflammationem applicuit collyrium ex aqua rosarum, & vitriolo albo; valde tunc doluit oculus, & aucta fuit inflammatio.

Venæ sectionibus & remediis antiphlogisticis alvum ducentibus opus erat, ut suppuratio impediretur.

Cessit tandem inflammatio, sed mansit opacitas in tota cornea, & oculus erat adeo sensibilis, ut nec minimum lumen ferre potuerit.

Dedi ter de die grana X. pulveris *A.*, & altero statim die oculus, qui antea erat totus siccus & aridus, cœpit multum plorare.

Spatio octidui puella eodem oculo potuit lumen sat commode ferre.

Finito mensis spatio oculus bonus fuit; nec necesse erat augere remedii dosim, quoniam has cito & bene perficiebatur curatio.

EXPERIMENTUM XXXVI.

Juvenis, 13, annorum, ad angulum externum oculi dextri habet tumorem ex rubro lividum a medio anno, & tota ejusdem oculi cornea est opaca, & obducta crassa albugine.

Suasi ut ter de die sumeret grana X. pulveris *A.*, qui in principio magnos dolores excitavit in oculo et tumore.

Spa-

Spatio octidui ex tumore fiebat abscessus, qui sponte rumpebatur, & pus bonum, copiosum effluxit.

Curavi dein ruptum tumorem tegi emplastro diach. simplici, & jussi, ut continuaret pulverem *A.* eadem dosi.

Spatio unius mensis tumor totus dissipatus est, & oculus naturalem pelluciditatem recuperavit.

EXPERIMENTUM XXXVII.

Puer, 10. annorum, ulcus sordidum & magnum habuit ad tibiam pedis dextri, collum & scapulam dextram serpigo antiqua occupavit.

Sumsit ter de die vasculum infusi lenioris *Pulsatillæ nigricantis*, & eodem infuso eluit mane & vesperi ulcus, & dein lintea carpta eodem infuso madida applicuit.

Spatio binorum fere mensium non solum ulcus perfecte fuit curatum, sed etiam serpigo tota evanuit.

Urina ex usu hujus infusi copiose eliciebatur.

EXPERIMENTUM XXXVIII.

Vir, 46. annorum, in oculo dextro propter cataractam admodum densam nil videt.

Sumsit nunc per quinque septimanas pulverem *B.*, & cataracta videtur tenuior, & æger, dum candela incensa fertur in cubile, lucis splendorem percipit.

Magnos semper ex assumpto remedio dolores sentit in oculo affecto.

EXPERIMENTUM XXXIX.

Vetula, 65. annorum, ultra viginti annos oculo sinistro prorsus nil videt; erat enim is totus ex ophthalmia inflammatoria destructus, & habebat figuram, molemque præternaturalem.

Sumsit per binos menses pulverem *A.*, unde in principio dolor ingens in oculo oriebatur, post aliquot dies cœpit pus
per

per narem sinistram mungendo prodire, dein ex partibus internis palpebrarum, & earum margine copiosum pus protrudebatur; membranæ crassæ, albæ, & variegati coloris, factæ sunt tenuiores, moles oculi diminuta est, & ægra hoc oculo potest nunc objecta distinguere.

EXPERIMENTUM XL.

Vir, 62. annorum, in oculo sinistro jam ultra septem annos habet cataractam, & nihil videt, oculus dexter ita quoque debilitatus & sensim turbidus factus est, ut miser nec labores suos amplius perficere, nec solus in platea ambulare potuerit.

Sumsit ter quotidie grana X. pulveris B., & jam solus per plateas incedit libere, & labores suos, qui oculum exactum requirunt, peragit, & in oculo sinistro candelæ lucentis splendorem percipit.

In hoc ægro promptiffimum remedii effectum observavi; nam hæ mutationes spatio duodecim dierum contigerunt.

Sunt adhuc numerosissimi ægri, qui extracto *Pulsatillæ nigricantis* utuntur, & in pluribus bonum effectum jam experior.

Vir, 35. annorum, pertinacissima melancholia laborans, & totus macilentus sumsit pulverem *B.* & inde intra paucum tempus reficiebatur, perversæ mentis ideæ disparuerunt, rediit robur, & sanitas.

Unde putabam: idem forsân medicamentum profuturum Epilepticis aut Maniacis.

Rogavi propterea Dominum *Faucken* & Dominum *Rechberger*, ut in suo Nosocomio ad S. Marcum, ubi tot homines similibus malis affecti decumbunt, experimenta instituerent.

Verum nec in morbo epileptico, nec in mania ullum ex hoc remedio effectum observarunt.

Au-

Augebatur dosis, donec epileptici drachmas duas, & aliqui maniaci drachmas tres pulveris *B.* per diem assumssissent; nec ullo modo inde afficiebantur.

COROLLARIA.

- 1.) *Pulsatilla nigricans* est remedium innocuum & efficax.
- 2.) Ægri videntur facilius ferre extractum hujus plantæ, quam ejus aquam destillatam, quoniam hæc majori dosi data aliquibus conatum vomendi, & nauseam excitavit.
- 3.) Nihilominus sunt ægri, qui hanc aquam sine omni molestia assumunt, & iis subinde prodest in vehementissimis artuum doloribus nocturnis, in tophis venereis &c. profuit quoque quibusdam paralyticis.
- 4.) Extractum *Pulsatillæ nigricantis* solvit potenter, nil tamen in corpore turbat.

D 4

5. Plu-

- 5.) Pluribus movet urinam copiose.
- 6.) Quibus tormina ventris exitat, & dein leviolem diarrhæam, his salutare plerumque est.
- 7.) In quibusdam chronicis oculorum affectibus videtur maxime convenire, & vix non specificè in oculos agere.
- 8.) Bonum est: si ægri sentiant inde in oculis dolorem.
- 9.) Amaurosım subinde curat, quandoque diminuit cataractam; pannos autem, ungues, & albugines frequenter dissipat, neque opus est ullo remedio externo.
- 10.) Infusum *Pulsatillæ nigricantis* tuto quoque datur interne, applicaturque externe in fœdis ulceribus, in carie, & serpigine.
- 11.) Quibusdam fœminis fluxum menstruum, præternaturaliter suppressum, *Pulsatilla nigricans* iterum excitat, & redigit in ordinem.

APPEN-

APPENDIX.

Biennio abhinc edidi libellum de usu interno & externo herbæ *Flammulæ Jovis*, & multis experimentis comprobavi: *Flammulam Jovis* efficacissimum quandoque Remedium esse in pertinacissimis & diuturnis capitis doloribus, in ossium doloribus nocturnis, in cachexia venerea, in scabie, herpete, in ulceribus ichorosis, fungosis, cancris, in carie ossium &c.

Iterata experimenta usu ejusdem herbæ & a me & aliis multis Medicis instituta eundem iterum effectum, & eandem efficaciam confirmant & adtestantur.

Fœminæ plures, summa & tristissima melancholia laborantes, infuso *Flammulæ Jovis* integre restitutæ sunt.

Ferdinandus *Leber* chirurgiæ Professor cancrum exulceratum mammæ, qui nec cicuta nec aliis medicamentis mitigari poterat, sola *Flammula Jovis* radicitus percu-

ravit publice coram suis discipulis & quibusdam Medicis.

De usu & utilitate *Cicutæ* ulterius disserere superfluum arbitror; quum novi viros cordatos, & bonos Medicos illam ea, qua par est, æquitate respicere, illamque ægris suis optato cum successu persæpe adhibere.

Extractum *Aconiti* flore cœruleo, seu Extractum *Napelli* nova experimenta semper magis magisque commendant; & est sane! egregium medicamentum, quod parva dosi multum præstat.

Prodest frequentissime in malis venereis, ubi laudata alia remedia incassum adhibentur.

Tollit quandoque exostoses venereas, & articulos rigidos reddit mobiles.

Levavit sæpius Podagram, Arthritidem, & Rheumatismos pertinacissimos.

Dedi hoc extractum in similibus morbis, etiamsi febris adfuisset valida; sed tunc adjunxi debitam nitri quantitatem.

Et

Et observavi hac methodo aliquoties vehementissimos dolores fuisse intra aliquot horas penitus dissipatos, qui per multos dies copiosissimis aliis medicamentis nec leniri poterant.

Plerumque sudor largus sequebatur.

Ægri ferunt hujus extracti grana duo, tria, quatuor, quinque &c. nycthemeri spatio, dosibus divisis.

Oxymel ex recenti & succulento *Colchici autumnalis* Bulbo paratum, plures iterum gravi hydrope, vel & asthmate glutinoso pessime affectos curavit pellendo urinam, aut promovendo sputa copiosa.

Si hoc oxymel ex Bulbo arido vel farinoso conficiatur, tunc caret omni efficacia.

Extractum *cicutæ* mixtum cum oxymelli *colchico* in hydrope, a viscerum obstructionibus orto, sæpe mira præstat.

Hyosiami Extractum spasmos & convulsiones frequenter compescit; juvat quandoque in morbo epileptico, in mania, & furore.

His-

BULLETIN NO. 10.

1908.

REPRODUCTION SERIES, No. 6.

BULLETIN
of the
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BOTANY, PHARMACY AND
MATERIA MEDICA

J. U. & C. G. LLOYD
CINCINNATI, OHIO

REPRODUCTION SERIES, No. 6.

HYDRASTIS CANADENSIS

Facsimile reprint and illustrations
of the article in

DRUGS AND MEDICINES OF
NORTH AMERICA
1884

By J. U. & C. G. LLOYD

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An investigation of the Properties of the Magnesia Carbonica, or Purum. By William Lawrence, of Maryland, Member of the American Academy and Philadelphia Medical Societies.

Travels Through the Interior Parts of North America in the Years 1786, 1787 and 1788. By J. Clever, Capt. Captain of a company of provincial troops during the late war with France. Illustrated with copper plates. London. Entered for the Author, and sold by J. Walter, at Charing-cross, and L. Coridon in Pall-mall Row, MDCCCLXXX.

Lasalle de San Medico Puro, Nigamito. By Antonio Sbrak. MDCCCLXXX.

BULLETIN No. 10. REPRODUCTION SERIES, No. 6. HERBACEA CONTINUOUS.

A Journal with illustrations of the herbs & Drugs and Medicines of North America, 1791.

BULLETINS SUPPLIED WHILST IN PRINT AT ONE DOLLAR EACH.

INTRODUCTION.

In 1884, under the title "Drugs and Medicines of North America," a quarterly publication was undertaken in Cincinnati by John Uri Lloyd and Curtis Gates Lloyd, the design being to comprehensively study American drugs, historically and otherwise, making a record thereof, in such a way as to be of use to present readers, and of increasing value as a reference record in the future.

To this object a corps of authorities in scientific directions embracing botany, medicine, pharmacy and chemistry, united their efforts, altogether voluntary. Among these special contributors in the opening number are to be found the following names: Prof. Roberts Bartholow, M. D., LL. D.; Prof. Virgil Coblentz, M. A., Ph. G.; Prof. E. M. Hale, M. D.; W. E. Hallowell, M. D.; Prof. J. A. Jeançon, M. D.; Prof. John King, M. D.; Mr. J. A. Knapp, Artist; Prof. F. W. Langdon, M. D.; Prof. F. B. Power, Ph. G., Ph. D.; Prof. A. B. Prescott; Dr. Charles Rice, Ph. D.; Prof. Eric E. Sattler, M. D.; Prof. Robert Sattler, M. D.; Prof. J. M. Scudder, M. D.; Prof. John V. Shoemaker, M. D.; Mrs. Louisa Reed Stowell, M. S., F. R. M. S., and Prof. Robert R. Warder.

To the efforts of these and such as these as special subjects opened their avenues, may be ascribed the high position that the publication immediately assumed in the scientific and professional world.

No efforts were spared to comprehensively present each subject, the plan being to commence with the Ranunculacæ, considering however only those plants having a record in medicine. From the Prospectus we extract as follows:

"It will be neither a Medical nor a Pharmaceutical Journal; but a serial devoted exclusively to the subject indicated in the title. All these journals will welcome it as an ally."

The first number of this 32-page quarterly appeared in April, 1884, with a frontispiece of *Clematis virginiana*, and the publication was continuous until June, 1887, (Vol. II, No. 5) when, owing to the press of business and the interest then being taken in library directions by the undesigned, it was discontinued. The publication as stated embraced Volume I and Nos. 1 to 5 inclusive of Vol II.

Among the drugs exhaustively considered, historically and otherwise to that date (1885), was *Hydrastis canadensis* (then only of Eclectic importance), the study extending from page 76 (October, 1884), to page 184 (June, 1885). Since that date, this drug has become of international importance, and there is an increasing demand for the *Drugs and Medicines* publication carrying this article. But this has long since been out of print, and consequently is not obtainable even for library purposes.

The Lloyd Library has therefore reproduced the aforesaid article on *Hydrastis*, and herein presents to its exchange list a verbatim print, with full illustrations, as it originally appeared in *Drugs and Medicines of North America*.

Respectfully,

THE LLOYD LIBRARY.

Cincinnati, June 1, 1908.

HYDRASTIS CANADENSIS.

GOLDEN SEAL.

PARTS USED.—The rhizome and rootlets of *Hydrastis canadensis* *Linn.*

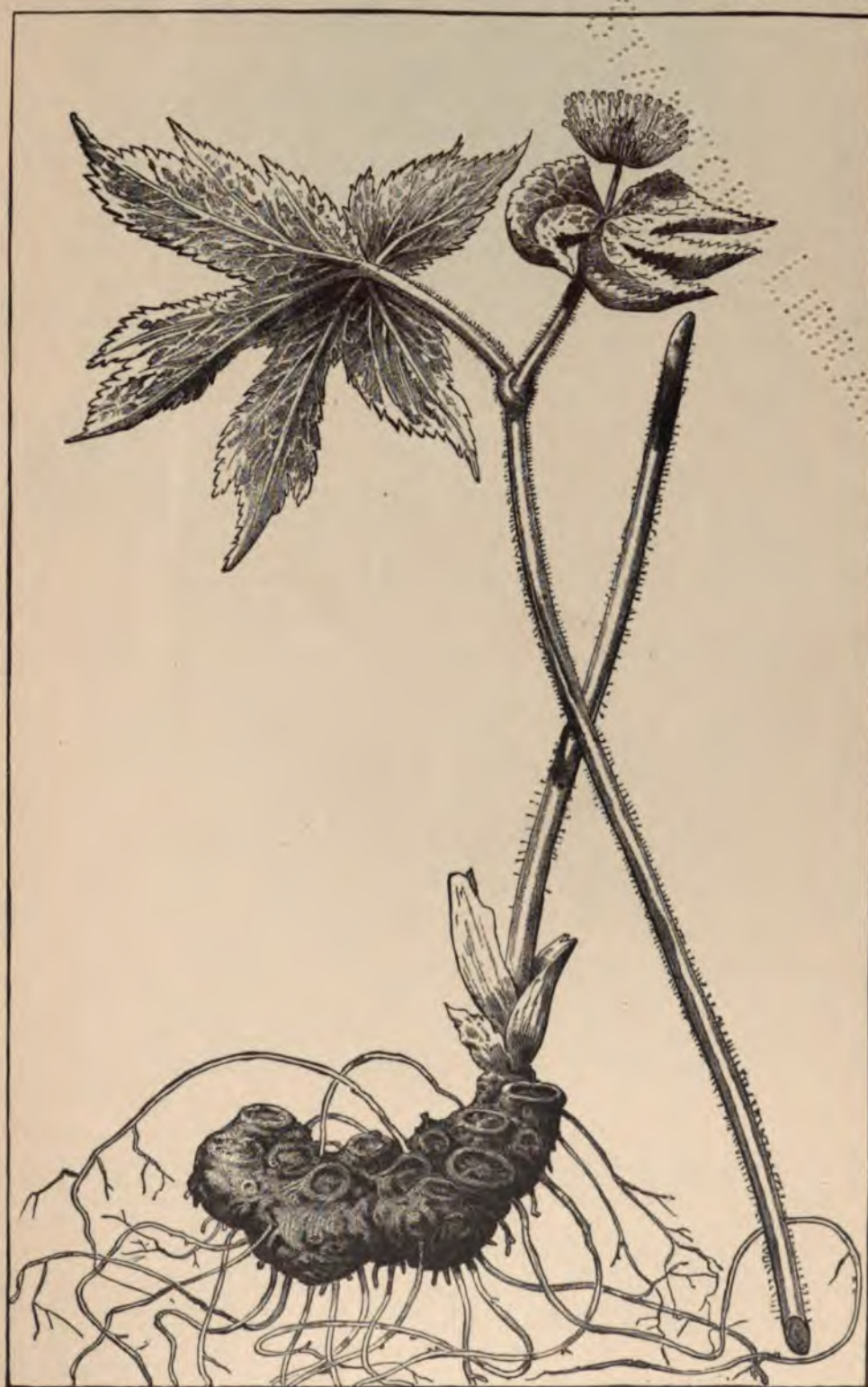
Natural Order Ranunculaceæ, Tribe Helleboreæ.

BOTANICAL ANALYSIS.—Rhizome knotted, horizontal, with fibrous roots. Stem, from six to twelve inches high when in flower, about a foot high when mature; erect, round, sparingly hairy, with short, somewhat appressed hairs; surrounded at the base with two or three yellowish scales. Leaves, two, alternate, roundish-cordate, five or seven palmately lobed, veiny; margins, doubly serrate: Lower leaf, the larger, on a petiole one to two inches long; upper leaf, sessile. Flower solitary, erect, terminal, on a peduncle from a half to an inch long. Sepals from two to four, generally three, round, concave, greenish white, caducous. Petals none. Stamens numerous, spreading; filaments thickened upward, white; anthers adnate, dehiscing longitudinally. Pistils, ten to twenty, in a head; ovaries one-celled, two-ovuled. Fruit, a head of fleshy carpels, each containing one or two small, black, hard seeds.

COMMON NAMES.—The Pharmacopœia (1880) has adopted, and we think wisely, Golden Seal as the common name for this plant. In commerce the drug is known either as Golden Seal or Yellow Root. The name Golden Seal is very applicable to the plant, and has reference to the seal-like scars on the rhizome, and its golden or yellow color. The term was introduced by the Thompsonians, and is largely used by the drug trade, especially by Eclectic houses. Yellow Root is also applicable, and is also a common name for the plant in commerce. Unfortunately, however, it has been applied to several other plants: One of them, *Xanthorrhiza apiifolia*, is an article of commerce under the name. On this account it would be better if the name Yellow Root, as applied to *Hydrastis*, should be discontinued in favor of the Pharmacopœial name. In addition to these two names, a number of local names have been given the plant. In botanical works it is usually called Orange Root or Yellow Puccoon. When in fruit the plant resembles an herbaceous *Rubus*, and hence is called Ground Raspberry. It was formerly reputed valuable as an eye-wash, and in old works the name Eye-balm and Eye-root are given to it. From the yellow coloring matter, and the fact that it was used as a yellow stain by the Indians, it has received the names Indian Paint, Yellow Paint, Indian Dye, Golden Root, Indian Turmeric, Wild Turmeric, Curcuma, Ohio Curcuma, Wild Curcuma (spelled in old works *Kurkuma*), Jaundice Root and Yellow Eye.

BOTANICAL DESCRIPTION.—*Hydrastis* grows in patches in rich, open, hilly woods. The stem is produced from a terminal bud of the perennial rhizome. Its growth is very rapid: a week or ten days' continuance of warm weather in May is sufficient for it to grow six inches high and to expand its flower. At the base the stem is surrounded by a few yellow bud-scales, and the color of the underground portion of the stem, and for about an inch above the ground, is light yellow.

In a patch of *Hydrastis* will be found, in about an equal number, two kinds of stems, sterile and fertile. The sterile stems bear only a terminal peltate leaf. In reality these sterile stems are radical leaves, with the articulation at the base of the petiole.



HYDRASTIS CANADENSIS.

ANALYSIS

The fertile stem is from six inches to a foot high at flowering time, round, erect, and about an eighth of an inch in diameter. It is naked below, and at the top apparently forks, one branch bearing a leaf, the other a smaller leaf and a flower. In fact, the stem bears two alternate* leaves and a terminal flower, the lower leaf on a stalk about two inches long, and the upper leaf sessile at the base of the flower stem.

The leaves at flowering time are only partly developed: the lower is larger, measuring from two to three inches in diameter; the upper, which is about half as large, encloses the flower in the bud, and is generally but partially unfolded when the flower opens. After the plant has flowered, the leaves grow to be six to eight inches in diameter. In shape they are roundish cordate, and have five to seven palmate lobes. The veins are very prominent on the lower side of the leaf.



FIG. 27.
Flower bud of *Hydrastis canadensis*.

The flowers are small, white, and last but a few days. A patch of *Hydrastis* will not remain in blossom longer than a week or ten days. The sepals are only seen in the bud, as they are caducous, falling away when the flower expands. The numerous stamens have white filaments, and they are the most conspicuous part of the flower.

The fruit ripens in July, turning from green to bright red. The color is of a very rich shade, and is that which is known to artists as crimson lake. It is borne on an erect stalk, about an inch long. In shape it resembles a large red raspberry, with coarse drupes. Botanically it is an *etærio*, viz.: a fruit consisting of several drupes aggregated together. Each fruit consists of from eight to twelve drupes. The drupes contain two, or, by abortion, one, round, black, shining seed, imbedded in a white pulp, which has a sweetish taste. Some of the drupes are generally entirely abortive, and some much more developed than others, giving the fruit an irregular appearance that is not sufficiently shown in our cut (Fig. 28), which was drawn from a very perfect fruit.

BOTANICAL HISTORY.—At the time Linnæus published the first edition of his *Species Plantarum* (1753), he was acquainted only with the leaves of the plant,† and from their resemblance to the leaves of *Hydrophyllum*, he supposed it to belong to this genus, and called it “*Hydrophyllum verum canadense*.”

* The alternate arrangement of the leaves is clearly indicated by the articulation. Plants are also occasionally found with three leaves, all alternate. A three-leaved specimen, sent us by R. H. Wildberger, has the two lower leaves of the usual size and position, the third a small, sessile leaf, placed about half way between the flower and middle leaf, and at an angle with both the other leaves.

† These specimens of *Hydrastis* leaves are still preserved in the Linnæan Herbarium. They were most likely given to Linnæus by Peter Kalm, the Swedish naturalist, who traveled three years (1749–51) in this country. On the sheet containing the specimens, Linnæus has written: “*Hydrophyllum verum canadense, cujus flores non videt.*—P. Kalm.” In this connection it is a little singular that Kalm makes no mention of the plant in his works. He was an excellent observer, and had he known any economic use for the plant, would have no doubt recorded it. At Philadelphia, the only part of his journey where he could have met the plant, it is very rare, and was probably not brought direct to his attention.



FIG. 28.
Fruit of *Hydrastis canadensis*.

A flowering plant of *Hydrastis** was obtained by Linnæus a few years later, and in 1759 he described the genus in *Systema Naturale* (Ed. 10, 1759), giving it the name *Hydrastis*,† and Ellis as authority for the name.

* This specimen, which in the Linnæan Herbarium has no mark to indicate from what source it was obtained, was probably given to Linnæus by John Ellis, who had many American correspondents. The specimen is a small flowering plant, broken off about three inches below the leaf, and is merely marked "*Hydrastis*," in Linnæus' handwriting. That Ellis was the donor of the specimen, we think is probable, because Linnæus gives the generic name, with Ellis as authority, though Ellis had never published any description of the plant.

† The derivation of this name is usually ascribed to the Greek words *ὕδωρ*, *water*, and *δρᾶω*, *to act*, in allusion to the medical action of the drug on the mucous membranes. This is, we think, an error, for probably neither Linnæus

100

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PLATE IX.



MAP SHOWING THE DISTRIBUTION OF HYDRASTIS CANADENSIS.

EXPLANATION OF THE MAP.

The explanation of the different shades is as follows:

Section 1st, Heavy Shade.—Territory over which the plant grows abundantly in its natural habitats. This section furnishes all the drug of commerce.

Section 2nd, Much Lighter Shade.—Territory over which the plant can be usually found, but not abundantly. In many parts of this section the plant is extremely rare, but a diligent search in situations suited to its growth will generally result in its discovery.

Section 3rd, Very Light Shade.—Territory over which the plant is generally absent, but occasionally reported from a few localities.

Unshaded Section.—Plant entirely absent.

In the same year (1759), Miller published a good colored figure of the plant, stating, "This plant has been lately introduced from North America by the title of Yellow Root, and the character of its flower and fruit being different from those of all the established Genera of Plants, I have given it the name of *Warneria*,* in honor to Richard Warner, Esq., of Woodford, in Essex, who is a very curious botanist, and a great collector of rare plants."

The name *Warneria*, given to the plant by Miller, was only adopted, as far as we can learn, by Jussieu, who changed it to *Warnera*. That it should not have been generally adopted is, we think, a matter of regret, as it was published the same year as Linnæus' name, and was accompanied with a picture, and also a very accurate description of the plant.

GEOGRAPHICAL DISTRIBUTION.—The area of country over which *Hydrastis* grows abundantly enough to be a commercial source of the drug, is extremely limited. In but four States, Ohio, Indiana, Kentucky and West Virginia, can it be profitably collected. Cincinnati is nearly the geographical center of this area, and the supply of the drug once reached the market through this city. In extreme southern Illinois, southern Missouri, northern Arkansas and central and western Tennessee, there are occasionally localities where the plant is common, but they are hardly of sufficient extent to yield any amount of the drug.

Throughout most of Illinois, northern Indiana, southern Michigan, the southern peninsula of Ontario, and near the base and along ravines of the Allegheny Mountains, the plant is found, but is scarce.

In Pennsylvania and western New York it is sometimes reported, but on every occasion as being extremely rare; and its discovery in most any section of these States is considered a matter of considerable botanical interest.

The plant grows in patches, generally on a hillside, in rich, open woods, where the leaf mould is abundant. It does not grow naturally in prairie countries, sterile soil, or swampy situations.†

Hydrastis has no power to adapt itself to altered conditions of growth. Cultivating the land is sure to exterminate it at once, and even cutting off the trees will cause it to disappear in a few years. It is the common report from all botanists that the plant is becoming scarcer every year. In many places where it formerly grew abundant, it is now reported rare.

DESCRIPTION OF THE RHIZOME.—The fresh, full-grown rhizome (see Plate VIII) is from one and a half to two and a half inches in length, and from one-fourth to three fourths of an inch in diameter. It usually subdivides when it reaches a length of from one and a half to two inches in length, and not

nor Ellis was aware of its medical action. It is probable that Ellis gave this name from what he supposed was its natural situation, from ὑδραία, an *imbibing of water*. *Hydrastis* is erroneously described as a bog plant in several old English works; and these statements are probably the cause of Prof. Wood, in as late a work as his *Class-Book*, giving its habitat as "bog meadows."

* This plate and name of Miller's was probably not seen by Linnæus until after the publication of the second edition of his *Species Plantarum* (1762). In Linnæus's private copy of this work, he has written on the interleaf opposite *Hydrastis*, "*Warneria* Mill. ic. 130, t. 285."

† The habitat in Wood's *Class-Book*, "bog meadows," is incorrect

unfrequently forms knotty clumps. When dry the diameter is from one-eighth to one-third of an inch. The color of the fresh rhizome, both internally and externally, is bright yellow, and the plant could be easily recognized by the bright color of the rhizome. The weight of the fresh rhizome, with attached roots, averages from eighty to one hundred and seventy-five grains, and we found that one hundred and sixty-six parts after drying gave forty-six parts. There is considerably more loss of weight by drying if the root is collected while the plant is succulent and growing, than there is after the fruit has ripened.



FIG. 29.

Dried rhizome of *Hydrastis canadensis*.

The dried rhizome is knotty, contorted, rough externally, of a dull brown color, and considerable soil usually adheres to that which appears in commerce. The young dried rhizome is usually marked by little ridge-like rings, from the sixteenth to the eighth of an inch apart. If it is gathered in the spring of the year, after the plant has commenced to grow, it shrivels in drying, and will be wrinkled longitudinally. Upon the upper side of the growing rhizome, near the stem, several cup-like projections are usually to be found, and these mark the positions occupied by former annual stems. These give the plant the name Golden Seal. The herbaceous stems are articulated to the rhizome, and easily broken off; hence remnants of the stems are seldom found attached to commercial hydrastis, and after the third or fourth year the scar (seal) often becomes indistinct. After four to six years' growth the rhizome gradually decays at one extremity as fast as it grows at the other, and hence a great age is not accompanied by a proportional increase of size.

The recent rhizome is thickly studded with fibrous roots which are sparingly distributed upon the upper surface, but abundantly upon the sides and lower part. These subdivide repeatedly, and when dry they vary in size from the twentieth to the fortieth of an inch, but when fresh are twice as large. The fresh fibers are from three to six inches in length, and are so brittle when dry that as found in commerce the rhizome is often nearly naked.

A transverse section of the rhizome shows that the central ligneous portion of the roots have their origin about one-third the distance from the surface of the rhizome. When fresh their structure is scarcely visible, but upon drying, the surrounding portions of the rhizome assume a hard, resinous appearance, and bright yellow aggregations are deposited upon the woody fibers.

The fresh rhizome contains an abundance of a bright yellow juice, which sometimes, in drying, assumes an orange-yellow color, and by concentration in certain places near the center of the root, occasionally imparts a reddish hue to the central part of the dried root. Usually, however, the fracture of a dry young root is golden or lemon yellow, and that of the old ones of a decided greenish yellow. When the dried rhizome is kept from season to season, it gradually changes internally to brown, or greenish-brown. This alteration com-

mences at the surface and creeps inward, until after some years, by this form of decay, the yellow principles will have nearly perished, and the drug will have become proportionately of less value.

If dried hydrastis is soaked in cold water, after some hours both the rhizome and roots resume near their natural size and fresh appearance. The freshly broken, dried drug presents a mealy appearance, and upon being magnified a few diameters this surface resembles broken yellow beeswax.

The odor of powdered or crushed hydrastis is peculiar and persistent, adhering for hours to the hands or the clothing of workmen who handle it in quantities.* All parts are bitter, and also impart, when chewed, a persistently acrid, irritating sensation, which is entirely distinct from true bitterness and the principle that produces the acidity occasions an abundant flow of saliva.

MICROSCOPICAL STRUCTURE.—(Written for this publication by Louisa Reed Stowell.)

Rhizome.—The cork upon the outside of the rhizome is composed of from four to eight rows of thin-walled, tabular cells, of a dark brown color, with broken and irregular walls, the outer edge of the cells frequently being darker than the inner. The green layer of the bark is composed of from twelve to fifteen rows of oval, clear white, thin-walled cells of parenchyma, loaded with starch grains, chlorophyll bodies, oil and protoplasm. The corners of these cells are thickened, leaving many little open spaces between the cells. The liber layer of the bark is very similar to the green layer, only that the cells are more compressed, fitting into each other so closely as to leave no intercellular spaces.

The cambium is composed of several rows of brick-shaped or tabular cells, separating the bark from the wood. They are clear white, with exceedingly thin walls, and contain only protoplasm.

The medullary rays are quite wide, and composed of a number of rows of parenchymatous cells, stronger and thicker walled than the cambium cells, and loaded with starch grains.

The pith has the usual appearance of large, hexagonal cells of parenchyma, loaded with starch grains.

The woody bundles between the medullary rays, the cambium and the pith, are not fully developed. There are a few small reticulated cells, with pointed ends, and surrounded with a small amount of prosenchyma and considerable parenchyma. The reticulated cells have quite thick walls, and are not parallel with the surface of the rhizome; so it is quite difficult to obtain a good longitudinal section of them. The prosenchyma is in clusters around the reticulated cells, and is of a bright yellow color.

Starch Grains.—Every part of the rhizome, excepting the cork and woody bundles, is loaded with minute starch grains. These are nearly round, with no

* Our experience is that after twelve hours have passed it will adhere to our clothing so noticeably as to be unpleasant to members of our family.

distinct rings or nucleus, and about 1-4000 of an inch in diameter. Occasionally they are found in groups of three, like the starch grains of sarsaparilla.

Root.—In the center of the root is the woody bundle. It is not perfectly developed, and often four clusters of reticulated cells are placed equal distances from each other. At the very center is found a small amount of wood parenchyma. The cells of prosenchyma found in the woody bundle are short and with thin walls. Surrounding the woody bundle is a single row of parenchymatous cells, with frequently the inner wall thickened like stone cells. This row is slightly tinged with yellow, and closely resembles the nucleus sheath of monocotyledonous roots.

The principle bulk of the root is found outside of the woody bundle, and is composed of simple parenchyma loaded with starch grains. This tissue occupies fully four-fifths of the entire root. On the outside of this parenchyma and surrounding the entire root, are two or three layers of dark brown, brittle, empty cells, closely resembling the cork cells of the rhizome.

All parts of the root, excepting the woody bundle and epidermal-like cells, are equally loaded with starch grains similar to those of the rhizome.

DESCRIPTION OF PLATES X. AND XI.

Fig. A. Cross section of the root of *Hydrastis canadensis*.—*a*, outer row of cells; *b*, parenchyma of the root; *c*, row of cells bordering the woody bundle; *d*, reticulated cells; *e*, central woody parenchyma; *f*, wood prosenchyma; *m*, root hair. (Magnified 75 diameters, and reduced $\frac{1}{3}$.)

Fig. B. Longitudinal section of the root.—*a*, outer row of epidermal-like cells; *b*, parenchyma; *c*, border cells of the woody bundle; *d*, reticulated cells; *e*, wood parenchyma; *f*, wood prosenchyma. (Magnified 75 diameters, and reduced $\frac{1}{3}$.)

Fig. C. Cross section of the rhizome of *Hydrastis canadensis*.—*a*, cork cells; *b*, green layer of the bark; *c*, liber layer of the bark; *d*, cells of the newly-formed cambium; *e*, medullary rays; *m*, woody bundle, with prosenchyma, parenchyma and reticulated cells; *g*, pith. (Magnified 75 diameters, and reduced $\frac{1}{3}$.)

Fig. D. Cross section of the rhizome.—(Magnified 20 diameters, and reduced $\frac{1}{3}$. For reference to parts, see Fig. C.)

COMMERCIAL HISTORY.—*The Early Record.*—Tradition teaches that *hydrastis* was valued by the North American Indians for a dye stuff, as well as in the treatment of disease. This is accepted by early American writers, and the rich color of its yellow juice renders the statement scarcely questionable, when we consider the value that our aborigines placed on bright colors. It is not always easy to establish authentic support for these accepted traditions, and we have therefore been to considerable trouble in searching the records, in order to discover a commercial value for *hydrastis* among the natives of America. This we are enabled to present as follows: Mr. Hugh Martin read a paper, October 4th, 1782, before the American Philosophical Society, entitled "An Account of some of the principal Dyes employed by the North American Indians." This paper was published in the transactions of the American Philosophical Society (1793, p. 224), from which we reproduce as follows:

"The Indians dye their *bright yellow* with the root of a plant which might very well be called *radix flava americana*. This root is generally

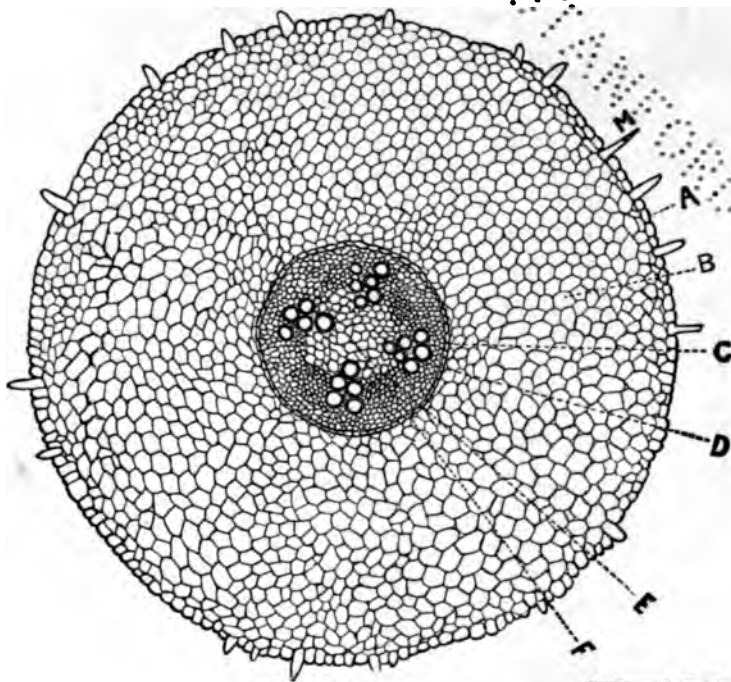


FIG. A.

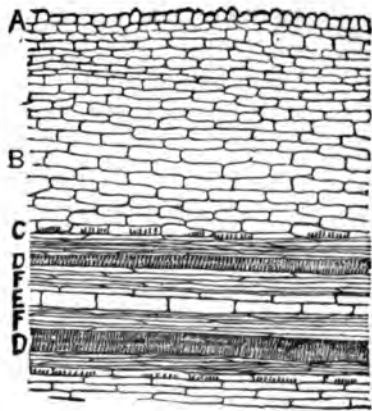


FIG. C.

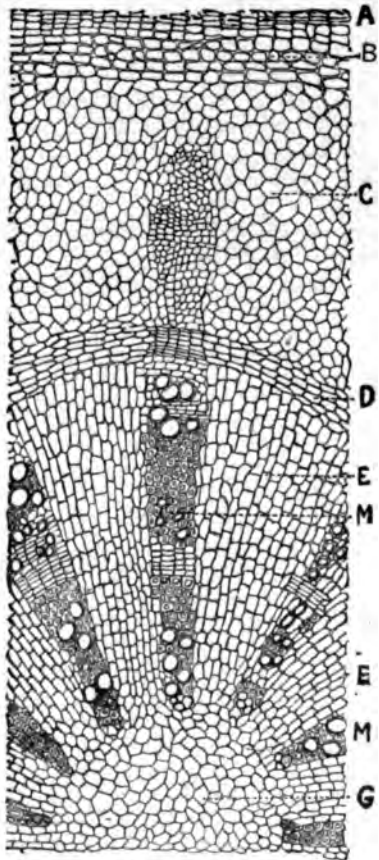


FIG. B.

MICROSCOPIC STRUCTURE OF THE ROOT AND RHIZOME OF HYDRASTIS CANADENSIS.

PLATE XI.

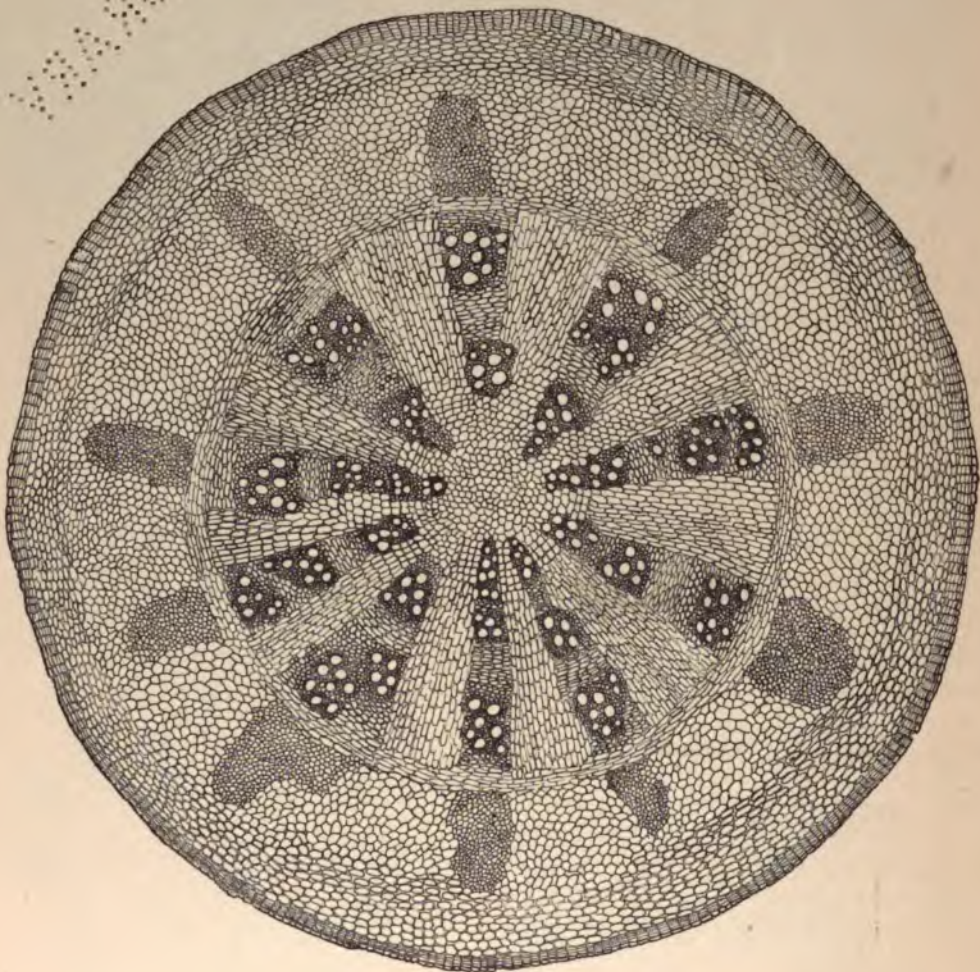


FIG. D,

MICROSCOPIC STRUCTURE OF A CROSS SECTION OF THE RHIZOME OF
HYDRASTIS CANADENSIS.

from one to three inches long, and about one-half an inch in diameter, and sends out a great number of small filaments in every direction excepting upward; these filaments are as yellow as the body of the root itself. From the root there grows up a stalk about a foot from the ground, and at the top is one broad leaf.* A red berry, in shape and size resembling a raspberry, but of a deeper red, grows on the top of the leaf. This berry is ripe in July."

From the time of the Indians until a demand was created for hydrastis by the Eclectics, it was scarcely an article of commerce, but about 1847 (see Medical History and Uses) it became an important drug with those who supplied the medicines known as Eclectic remedies.

In viewing the commercial history of hydrastis, we find that it was scarcer and more expensive in its early day than afterward. The explanation is of interest, as other American drugs are usually found to have similar records. This was owing to the fact that botanists were few, and that there was comparatively little demand for American drugs. In consequence, it became necessary that a higher priced labor should procure the drug at that day than is engaged in its collection at present. Therefore, notwithstanding its abundance and the limited demand as compared with the present day, hydrastis was formerly more expensive than now.

Variation in Supply.—Cincinnati, at that day, was the source of supply for the country, as indeed it largely is at present. When crops are abundant and money plentiful, fewer persons engage in the collection of herbs than during seasons of a failure in produce, or in hard times. In consequence of this fact, the price of hydrastis tends to be greater when the commercial interests of the country are prospering, rather than when there is a depression in trade. This alone will not, however, account for the variation in price as witnessed during the past fifteen years. It is true of hydrastis as with many other of our indigenous drugs, that occasionally, and without any apparent reason, the supplies will be consumed at a season of the year when it is impossible to replace them. This creates an immediate increase in price, and an unwarranted valuation will be temporarily affixed to the drug by those who are compelled to have it. This fictitious price stimulates many persons to collect it who would not do so under other circumstances. The result is that after a few seasons the stock of the country is more than replaced, after which the market becomes glutted. It requires months to make this fact known to the root diggers, and as a consequence they often have a quantity of the drug left on their hands. This they must then dispose of on a market in which there is really no demand, and prices fall to less than the cost of collection. Then the collectors turn their attention to other substances, the hydrastis stocks of the country are gradually consumed, and prices are quiet and regular, until finally it is found that the supply is again exhausted, when "history repeats itself."

* It is only the sterile stems that have solitary leaves. Those that bear fruit always have two leaves. Mr. Martin is a little confused in his statement.—L.

The foregoing record may be modified by circumstances of a local nature, such as the opening of a railroad through a new country; and in one case we know the market to have been temporarily (locally) glutted with hydrastis from this reason.

It will therefore be seen that with hydrastis the periods of abundance in market are not necessarily connected with the season's influence on the growth of the drug, although a long, wet autumn favors its collection. Indeed, this plant is of slow growth, and the question of its supply in market does not seem to be dependent on a favorable season.

Fluctuations in Price.—In arriving at the statistics herein tabulated, we must call attention to the fact that little dependence can be placed on old commercial prices currents.* Persons familiar with indigenous drugs will recognize the fact that list prices to the consumers of these drugs are not altered, unless some unusual reason exists for making a change.† Therefore we shall give this record from information furnished us by dealers in the drug and our own experience.

About 1844, Mr. Joseph West was a member of the Shaker village near Lebanon, Ohio. He distinctly recalls the early commercial history of the drug, and supports his evidence with figures that give the commercial value of hydrastis between the years 1844 and 1850 at \$1.00 per pound. Dr. T. C. Thorp, of Cincinnati, an early dealer in indigenous drugs, corroborates him in these particulars; and we are thus enabled to show that at first hydrastis commanded a very much higher price than it has at any subsequent day.‡

The first demand was supplied at a price of \$1.00 per pound, and from that the drug fell to forty cents, and afterward to twenty-five cents. It sold at \$1.00 in 1849.§

In continuing the commercial history, we find that it declined in price until it reached this valuation of about twenty-five cents per pound, which may be said to have been the average price between the period of its fictitious valuation in the early day, and the close of the war.||

After the war the depression in trade that followed caused hydrastis to further decline, until its ruling price was from twelve to fifteen cents, and finally the price paid to the collector was only about eight cents. This did not repay the labor of collection, even to the class of people who dig roots, and the drug

* In the early days hydrastis was mostly in demand by physicians who carried their own drugs, and hence it was not named in regular drug lists.

† The writer has known some of these drugs to be sold for less than cost, rather than change the price temporarily.

‡ There is little use to search elsewhere than about Cincinnati for a record of this drug from first hands at that period. Then Cincinnati was the headquarters for American drugs, and hydrastis especially came into market almost entirely from this city.

§ Mr. West writes us, "Prior to 1846, we dug and sold golden seal root at \$1.00 per pound."

|| Dr. Thorp states that during the war there was a market for all the hydrastis that came into Cincinnati at 25 cents. There was a scarcity in 1867 and 1868, the prices being 50 cents (1867) and 40 cents (1868), as shown by sales of Mr. West; but this was simply one of the periods of scarcity to which we refer elsewhere.

nearly ceased coming into market.* In the winter of 1867 and 1868 a general demand arose, for it was found that the stocks were exhausted and could not be replaced.† Then an advance followed, and collectors were paid as high as twenty-two cents for a limited period, and in some instances fifty cents (1867) and forty cents (1868).‡ Prices afterward gradually returned to their normal condition, and in 1879 the market was glutted and the warerooms were overflowing. At this period the price became so depressed that commission houses were glad to dispose of the drug for six and eight cents per pound; and we recall one lot of eight thousand pounds that sold in Cincinnati in 1880 at four cents.§

All collection of hydrastis had now ceased, and in 1881 many parties were found without a supply sufficient to carry them to the next season, and that year the memorable drouth that extended over the entire section of our hydrastis producing country rendered its replacement impossible.|| During the winter of 1881 and 1882 hydrastis, in consequence of these combinations, advanced to a figure above anything that it has occupied since 1856, and the crude root sold in lots, when it was attainable, at from thirty-five to fifty cents per pound. The price in a small way was higher, and we recall several sales of from twenty-five to fifty pounds each of powdered hydrastis that commanded seventy-five cents.¶ One stock of twenty thousand pounds was entirely disposed of for not less than thirty cents. During this hydrastis famine consumers resorted to every available method to procure it. Advertisements were placed in the country papers, and even religious newspapers were used to reach the collectors; but of course there was no immediate return, because the drug could not be found and collected in the winter season. The collectors of 1882 received from twenty-two to twenty-five cents at first, but eventually the price

* From 200 to 250 roots of dry hydrastis are required to make one pound, and after paying commissions it can bring but a trifle to the digger at six cents. In our pamphlet of 1878, entitled "*Berberidaceæ of North America*," we describe the people who gather the May-apple, and as the same class gathers hydrastis, we reproduce a portion of that description: "Large amounts from the mountainous and hilly parts of Kentucky and Virginia reach this (Cincinnati) market, from whence it is often shipped in quantities to eastern and other cities. It is gathered by the poorer classes, and regions of country not adapted to cultivation usually furnish the supply. The 'diggers' carry it to the nearest country store and exchange it for groceries and goods. The storekeeper in time accumulates a sufficient amount, sometimes several tons, and consigns the lot to a commission merchant or drug-broker, who disposes of it to manufacturing pharmacists or wholesale druggists. It is usually poorly washed, and is mixed with foreign substances such as trash, dirt, and varieties of other roots; large amounts are shriveled and worthless, being gathered out of season. Such a state of affairs results from the extremely low price of the article; and when we take into consideration the fact that it has paid two commissions and been transferred a hundred miles or more, we can not wonder that the poor digger is careless, or, that the 'root and herb gatherers' are the most distressed of our population."

† Hydrastis should not be gathered before the fruit turns red. After this occurs the plant quickly dies to the ground, especially during a dry season, and soon every vestige of it disappears. Thus it is that when the stock of the country is exhausted, it can not be replaced before the next season.

‡ The house with which the writer is connected was compelled to pay more than double their customary price for some thousands of pounds that had been sent from our city to New York, and we had to freight it back again.

§ This lot sold, in 1882, for thirty cents in New York, and part of it, we are informed, returned to Cincinnati at a higher figure.

|| Members of the American Pharmaceutical Association will remember this drouth. It was the year the Association met at Kansas City, and the journey over the parched plains of what is usually a rich, verdant country will not soon be forgotten by those who made the trip.

¶ The question was not, What is it worth? but, Can you spare any? It must be remembered that the stocks in market really had cost but from six to eight cents, and a price of even twenty-five cents seemed exorbitant. However, these could not be replaced at the old figure for some time.

fell to fifteen and eighteen cents. Notwithstanding the stimulus of these figures, only an average supply was obtained, for with the entire stock of the country exhausted, it was impossible to more than replace it in one season, and the dealers in hydrastis were glad to get it in 1883.* Even now (1884) the price is firm at figures that really are higher than usual. However, the drug is freely coming into market, the small avenues of supply are running into the main channels, and it is not impossible that there will be another surfeit before many seasons.†

The Supply of Hydrastis.—By referring to our map (Plate IX.) it will be seen that comparatively a small section of country produces hydrastis in quantities sufficient for collection. Of this portion, a few narrow channels really produce all the drug of the market. The main source of supply is the country bordering on the Big Sandy river, and the adjacent mountainous portions of eastern Kentucky and West Virginia. Southeastern Ohio, where the country is hilly and broken, also contributes, but not as largely as the portions mentioned of Kentucky and West Virginia. It will be seen that these sections of country are tributary to the Ohio river, and naturally the drug collects in the country stores along the Ohio valley, and eventually much of it arrives in the Cincinnati market by shipment down the river, although some is retained in Wheeling, West Virginia.

Considerable amounts now reach the eastern cities via the Baltimore & Ohio Railway, and since the completion of the Chesapeake & Ohio Railroad through the mountains of eastern Kentucky and West Virginia, a portion of it passes to the seaboard by that line, which also, by means of its connections with the northeastern part of North Carolina, brings to that market a limited supply from the Allegheny Mountains, in the northeastern part of that State. It is estimated by Mr. George Merrell, that of the hydrastis which would ten years ago have all drifted to Cincinnati, but three-fifths now appears in this market, the remainder reaching eastern cities.

The Ohio & Mississippi Railway and the Ohio river carry the hydrastis from southern Indiana (yearly diminishing in amount) to either Cincinnati or St. Louis, although the latter city receives in all but little of the drug.

The sections of country that we have mentioned supply the hydrastis of the world. If the real collecting portions of these States could be placed together, we doubt if the space would occupy more room on our map than the size of the thumb nail. Of course limited amounts occasionally appear in other sections, but these are unimportant and spasmodic. We have consulted every prominent dealer or collector in American drugs in the hydrastis section of the country, and have corresponded with the wholesale druggists in each city

* It must be remembered that one season will not inform all the root diggers that a drug is in demand. Many of them live in mountainous countries, and it is not unusual for them to learn of a demand, then turn their attention to collecting the drug, and finally bring it to market when the demand is over.

† In this connection we must not overlook the fact that liberal advertisements of preparations of hydrastis have had a tendency to create an unusual demand during the past three years. There is no doubt that more hydrastis is now being consumed than ever before.

within and adjacent to the territory. We think that we have recognized every avenue that brings this drug to market, and every section that produces it for market.

The Past and Present Supply.—By consulting our map (Plate IX.), it will be seen that only a small area of country can yield the drug in amounts sufficient to repay collection at present prices, and of this section of country but a limited portion actually contributes any of it to the market. It does not necessarily follow, however, that the plant will not disappear over sections that have never yielded the drug. Hydrastis is so sensitive that even a partial destruction of the timber causes it to shrink away, and one turn of the soil by the plow blots it from existence. If it were like Podophyllum, and content to thrive in woodland pastures, the future would be brighter; as it is, each year witnesses a shrinkage in area and a loss to the world (without economic return) of this peculiarly interesting American plant. It has nearly vanished from the rich hillsides bordering the Ohio river, and is no longer found in quantity in the populated sections of our valley. The more inaccessible portions of broken hillsides must now be drawn upon, and in this view of the matter we find a second in Mr. George Merrell,* who writes us as follows:

“I think the root is becoming scarce, being gathered now, I am told, in small quantities, in isolated places here and there, where in former years it was found growing more like we have seen Podophyllum, in large patches.”

In this particular we agree with Mr. Merrell, and from the foregoing view only of the matter we would readily decide that the drug would drop out of market in a moderately near period; however, there is another side of the case.

The mountainous sections of the States we have named can never be cultivated, and they are peopled by a class of inhabitants who barely exist, and who are perfectly content if they only exist. These persons have few expenses, and depend mainly upon the game of their forests and the ginseng and other marketable drugs of their hillsides. The game is becoming extinct, but the nearly inaccessible mountain sides are covered with the virgin forests, and excepting ginseng, with the original luxuriant vegetation and undergrowth. These people are doubtless now turning their attention more directly to our native drugs than ever before, and although the mountainous territory that yields hydrastis is small compared with the United States, it covers considerable area. Over this country these inhabitants and their descendants will ever wander and eke out their existence.† They may dig hydrastis for many decades without exhausting it, for to dig a patch is to leave enough to reproduce itself. They will not have the aid of the plowshare, as was the case when the drug disappeared from the now cultivated Ohio Valley hillsides; and unless some unusual

* Mr. Merrell is a son of the late Wm. S. Merrell, who really introduced hydrastis as a drug into commerce. Mr. Merrell is now the moving spirit of the firm that is the heaviest consumers of hydrastis in the world, and his statistics are particularly valuable.

† Apparently in a miserable condition, in reality happy and contented. To pass through these sections of country is to have our sympathies excited, and unnecessarily. These people ask only to be left to themselves and their mountains.

demand springs up, it is not unreasonable to argue that hydrastis will continue in market as plentiful and as cheap as at present for a generation, perhaps generations to come. This argument is supported by the fact that since the introduction of the drug it has decreased steadily in price, and excepting the periodical scarcity we have mentioned (see *Fluctuations in Price*, p. 90), there has been an abundance of it. The fact that large lots were a drug on the market in 1879, and sold at less than cost of collection (we doubt if any instance preceding 1879 can be shown where as much as 20,000 pounds sold for from four to eight cents), would seem to indicate that the decrease in area is not necessarily accompanied by a decreased supply. The fact is, that the large territory once rich in hydrastis, and now depleted, furnished but a small amount of the drug. The timber was chopped and the underbrush cleared away, without any return. Only here and there did a "root digger" ply his vocation, and great, rich sections of our country, from which the plant is now nearly exterminated, have never furnished a pound of the drug.

Consumption of Hydrastis.—It is usually difficult to arrive at an exact statement regarding the consumption of a drug, but, thanks to dealers and the liberal spirit of manufacturing pharmacists, we are enabled to present statistics that are certainly not far from correct.

The total yearly production of hydrastis will not vary much from 140,000 or 150,000 pounds. We had estimated 140,000 pounds, from statistics furnished by first hands for the drug, and Mr. Geo. Merrell places it at near 150,000.

Of this amount, from 25,000 to 28,000 pounds are annually consumed in making the alkaloids, and the remainder is retailed, powdered, made into pharmaceutical preparations, and exported. It is used in some proprietary medicines, one notably consuming considerable amounts.

Export of Hydrastis.—There is some demand for hydrastis in Europe, although but few of our drug brokers have any European trade in it. From statistics kindly furnished us by exporters, we find that 15,000 pounds were exported in the fall of 1883, but that the foreign consumption is spasmodic. Some of our most prominent jobbers and brokers state that they have never had a call for it from Europe, while others report yearly shipments of from 200 to 1,000 pounds. The demand seems to chiefly come from manufacturing chemists, makers of proximate principles of plants, rather than from those who supply physicians, and we can not find that the drug has been long used in any amount as a remedy in European medicine. During the past year a few contributions to the medical press of Germany and other European countries have directed attention to hydrastis, but the demand that has followed it has, according to our record, mainly been for the fluid extract or proximate principles.

ADULTERATIONS.—The substances which usually contaminate our indigenous drugs, are to be found mixed with hydrastis. Fragments of foreign roots, such as serpentaria, cypripedium, senega, collinsonia, jeffersonia, trillium,*

* We once mentioned this fact, using the name beth root instead of trillium. As a consequence, we found it

etc., are common, and these admixtures usually result from carelessness of the collector. In a few (exceptional) cases, however, we have found them to constitute more than half the gross weight of several bales of the drug; and under these circumstances the admixtures were intentional.

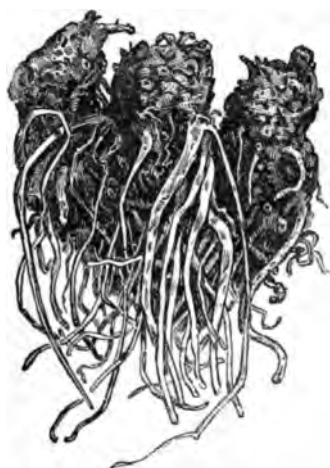


FIG. 30.
Root of *Stylophorum diphyllum* (one-half natural size).

The root of *Stylophorum diphyllum** resembles *hydrastis* in color when fresh, having a golden yellow juice, but it changes throughout to a dirty gray upon drying. Our attention was once called to a lot of one hundred pounds entirely made up of the root of this plant, which was thrown upon the market as an extra "Large Golden Seal." The appearance of this root will not permit of a confusion of it with the rhizome of *hydrastis*. (See Fig. 30). In our opinion, the color and peculiar odor of dried *hydrastis* will prevent any careful person from mistaking it for the root of any other plant known to us. However, very much inferior *hydrastis* is in commerce, some of it objectionable because of its having been gathered too early in the season, other portions because

of dirt, mould, or admixtures. In consequence of these facts, much of it is unfit for use, and purchasers should exercise care in its selection.

PHARMACOPŒIAL HISTORY.—*Hydrastis* had never been recognized by any Pharmacopœia until it was made officinal in the Pharmacopœia of the United States, in 1860, as "the root of *Hydrastis canadensis*," and then no preparation of it was introduced.

The Pharmacopœia of 1870 continued it under the same name, and authorized the preparation of a fluid extract of *hydrastis*.

The revision of 1880 recognized it as "the rhizome and rootlets of *Hydrastis canadensis*." This revision continued the fluid extract, and introduced a tincture.

CONSTITUENTS.—*Berberine: History of the Name of this Alkaloid.*—In 1824, Huttenschmid discovered a substance in the bark of *Geffroya inermis*, and gave it the name *jamaicine*. This Wittstein (*Organic Principles of Plants*, p. 26) accepts as *berberine*.†

Chevallier and Pelletan discovered it in the bark of *Xanthoxylum Clava Herculis* (1826), and named it *xanthopicrite*, a name that could have been very appropriately applied to this rich, yellow alkaloid.

copied into journals on each side of the Atlantic as *beet* root, a substance that could not well be used as an admixture with *hydrastis*.

* This plant is of interest, and will be considered by us in our publication in its proper place.

† Gmelin overlooked the work of Huttenschmid, and ascribed, in his *Hand-Book of Chemistry*, the discovery of *berberine* to Chevallier and Pelletan. Compare also the statements of J. Dyson Perrins, in the *Journal of the Chemical Society* (1863), and its reprint in the *Pharmaceutical Journal and Transactions* (1863), p. 464.

Rafinesque (1828) named the yellow coloring matter of *Hydrastis canadensis* hydrastine.*

Buchner and Herberger (1830) gave the name berberine to a purified extract of *Berberis vulgaris*, although Brandes previously (1825) may be said to have described a yellow coloring matter that he obtained from this plant.† He did not ascribe a name to it.

Thus it will be seen, accepting all of these substances to be identical, that the name berberine appeared last.

In reviewing the record, we are at a loss to determine why the names that were entitled to the precedence should have been displaced by the term berberine. It may be argued that the words jamaicine and xanthopicrite were not affixed to definite proximate principles, but since the name berberine was originally applied to a solid extract, we can not argue in its favor from that view. The word hydrastine, announced by Rafinesque in 1828, was overlooked by all writers, so that this term could not have entered the lists even had it been known at an early day that this substance was identical with berberine. Therefore the name least entitled to the honor from a chronological standpoint is the term berberine, which by common consent has been accepted.

History of the Alkaloid Berberine.— Authorities have recorded the history of this alkaloid in Europe. Since they overlooked the American history, or were not conversant with it, we shall introduce it, and in connection endeavor to review the entire matter, which can not but be of general interest.

As before stated, Huttenschmid (1824) gave us the name jamaicine; Chevallier and Pelletan (1826) gave us the name xanthopicrite; Rafinesque (1828) introduced the name hydrastine; and finally (1830) Buchner and Herberger announced berberine.

The fact that Rafinesque had entered the lists seems to have then been unknown, and we can find no recognition of him by subsequent investigators; and it seems to us an oversight in passing the work of this eccentric but talented scientist.‡ His "Medical Flora of the United States" (Vol. I.) was written between the years 1816 and 1828, being published at the latter date. In it (p. 253) he defined the yellow alkaloid of *Hydrastis canadensis* as "a peculiar principle *hydrastine*, of a yellow color." We fail to find a better description of this alkaloid until years afterward, for Rafinesque individualized hydrastine, and pointed to it as the prominent principle, by saying of hydrastis, "It contains amarine, extractive, several salts, and a peculiar principle *Hydrastine* § of a yellow color."

* Medical Flora of the United States, 1828, Vol. I., p. 253.

† American Journal of Pharmacy, Vol. III., 1831, p. 173. Also Gmelin's Hand-Book of Chemistry, Vol. XVII., p. 186.

‡ It is true that Rafinesque took the broadest liberties with the sciences in which he wrote, and few will deny that he was very egotistical. However, he was a persistent student, and his works become more valued as the years pass. He entered the field as a writer in several branches of the Natural Science of his day, and it is now recognized that many of those works are among the most difficult to obtain. His "Medical Flora" is rare indeed, and his work upon Fishes is entirely out of market.

§ Italicized by Rafinesque.

We are thus careful in giving this record because the name hydrastine was accepted by a very considerable body of practitioners (Eclectic), and in American commerce it is now hydrastine. *

In continuing the history, we find that in 1830, when Buchner and Herberger announced the name berberine, it was applied to a purified extract of *Berberis vulgaris*. † The substance obtained by them was neither berberine nor a salt of berberine, and the berberine present in their extract could have only represented a small portion of the product. Their process will not admit of any other view of the subject, and the yield of berberine they report, seventeen per cent., can not be obtained from *Berberis vulgaris*. Hence the name berberine was not originally applied to an alkaloid.

In 1835, Prof. Buchner and son obtained, unknowingly, the hydrochlorate of berberine in crystalline form, but thought it a neutral principal, or a weak vegetable acid, and thus we may ascribe to the Messrs. Buchner the honor of really obtaining from *Berberis vulgaris* the first salt of berberine. ‡

Dr. George Kemp, in 1839, assigned berberine to a place among the alkaloids, producing a combination with picric acid. He recorded his experiments in Buchner's *Reportorium*, 1840; but this fact seems to have been overlooked. In 1841 he investigated the substance more thoroughly, producing a hydrochlorate, sulphate, acetate, and some other salts; but in consideration of a request from his friend Prof. Buchner, who wished his (Buchner's) son to re-examine the subject, Kemp withheld his paper from publication. §

Thus it occurred, that in 1847, Thomas Fleitman, unconscious of Kemp's work, published an essay on berberine and its salts, without recognition of Dr. Kemp's labors in the same field. He demonstrated that berberine was neither a neutral coloring matter, nor a weak acid, as the Messrs. Buchner had supposed, but a true alkaloid, and strongly basic. He even examined a portion of the substance made by the Messrs. Buchner in 1835, and supposed by them to be either a neutral principle or a vegetable acid, and found it to be hydrochlorate of berberine. And outside of Mr. Fleitman's report, the testimony from the Messrs. Buchner's description is, in our opinion, to the effect that they obtained hydrochlorate of berberine. They described their product as "A very light powder, composed of acicular crystals, of a bright lemon yellow color, very slightly soluble in cold water." This description will not apply to the alkaloid.

Hence we find that Thomas Fleitman gave to the world (1847) the first general intimation of the basic character of berberine, and he is, therefore,

* When it was shown by Mahla, 1862, that the substance employed by Eclectics was identical with berberine, they (Eclectics) would more readily have accepted the name berberine if it had quietly been announced. Considerable feeling once existed relative to this substance, and Eclectics were not willing to be driven into the use of a name that from their view came after the name hydrastine. But that feeling has passed, and the least said the better.

† Compare *Am. Journ. Pharm.*, 1836, p. 368, from *Journ. de Pharm.*, 1835.

‡ The date of its appearance is variously stated at 1830, 1832 and 1835. Dr. F. F. Mayer refers to Buchner's *Report.* xxxvi., p. 1, 1830, for the original paper (not at our command). See also *Pharmaceutical Journal and Transactions*, 1863, p. 417. We therefore accept 1830 as being well authenticated.

§ *Chemical Gazette*, 1847, p. 209.

accepted by most writers as having assigned it to a place among the alkaloids, although it is established that it had been known by Dr. Kemp to be an alkaloid from the year 1839. *

History of the Yellow Alkaloid (Berberine), as Obtained from Hydrastis Canadensis (1828), Originally Called Hydrastine. — We will again repeat, that in America the name hydrastine was originally given, by Prof. Rafinesque, to this alkaloid, which is the principal coloring matter of *Hydrastis canadensis*, and that he gave it before the name berberine appeared in Europe. By this name it was accepted when introduced into American medicine by the Eclectics (1847), Rafinesque's works being prominently recognized by this section of the medical fraternity. In our botanical history of *Hydrastis* (p. 83), we presume to regret that the appropriate name of Ellis (*Warneria*), was not continued to the plant, instead of the illogical name *Hydrastis*. We also think it unfortunate that, since the name *Hydrastis* was accepted by botanists, it was not followed by chemists in the naming of its prominent constituent, the yellow alkaloid.

No printed process for making the yellow alkaloid (berberine) appeared before 1851, and we must consider that Mr. Durand first announced a salt of berberine from *Hydrastis canadensis*, although he was unconscious that it was a salt. In the year 1850, he wrote a paper on *Hydrastis*, and published it in the *American Journal of Pharmacy*, April, 1851, in which he called attention to "a yellow coloring matter" made by precipitating an alcoholic tincture of the root of *Hydrastis canadensis* by means of a solution of bichloride of tin, describing it as "a most brilliant yellow precipitate." This substance Mr. Durand neglected to investigate, but suggested that it might "prove a useful pigment in oil and water painting." It was hydrochlorate of berberine, and thus he was the first to obtain a salt of this alkaloid from *Hydrastis canadensis* and record the fact.† At this time Eclectic physicians were using the substance as a remedy under the name Hydrastine, or Neutral Hydrastine, and hence it is that the hydrochlorate of the alkaloid was the first definite preparation supplied to the medical profession of America. ‡

Although Mr. Durand prepared the hydrochlorate of the alkaloid berberine, in 1850, from *Hydrastis*, and Pharmacists who made Eclectic medicines had supplied it to the medical profession in considerable quantities from before that period, neither had identified it as berberine, or as a salt of that alkaloid, although it was certainly known, by a few, to possess alkaloidal properties.§

* Mr. Fleitman's paper may be found in the *Chemical Gazette*, 1847, p. 129, and following it in a subsequent number, p. 209, the statement from Dr. Kemp, that he (Kemp) had long known of the basic character of berberine, and had remained silent out of respect to the request of Prof. Buchner.

† By a coincidence, the first preparation of the alkaloid used in American medicine was also considered a neutral principle, and in reality was hydrochlorate of berberine. It was called Hydrastine Neutral, being made from *Hydrastis canadensis*.

‡ At first sight it may seem strange that the investigators, without exception, failed to ascribe to this substance alkaloidal properties. It was discovered independently in different plants, by several persons, as our history will show, and in no instance was it identified. Upon deliberation, however, it will be seen that in that early day the alkaloidal tests now so easily applied were unknown. Therefore an alkaloid, forming with hydrochloric acid an almost insoluble salt, was an exception to all known alkaloids, and consequently not likely to be compared with other organic basis.

§ See Grover Coe's work, *positive Medicinal Agents*, 1855. And we refer the reader to our historical introduction of hydrochlorate of berberine for some points in this connection.

Nothing appeared after Mr. Durand's work for a period of twelve years; but in 1862 the subject was taken up by Mr. F. Mahla, of Chicago, and in a paper contributed to the American Journal of Science and Arts, January, 1862, he clearly established the fact, that the Eclectic "Hydrastine" was the salt of an alkaloid, and that this was berberine. Therefore, to Mr. Mahla is due the credit of really identifying as berberine the alkaloid that had been discovered fifteen years previously in *Hydrastis canadensis*.* In this connection we must not forget to record the fact, that Mr. J. Dyson Perrins, of England, really discovered berberine in *Hydrastis* before Mr. Mahla identified it, but he neglected to announce the fact. He states in the Journal of the Chemical Society, 1863, that "sometime before the publication of Mahla's paper, I had noticed the occurrence of berberine in *Hydrastis canadensis*," and thus Mr. Perrins stands in comparatively the same position as Dr. Kemp, both having anticipated the work of the persons who made the announcements.

The Past and the Future Name of this Alkaloid.—It may seem that we overstep the line of prudence, and pass into a field that we should not presume to enter, when we even announce a heading such as the above. We trust, however, that our experience with this almost exclusively American drug, our aggravations commercially, and our endeavor to familiarize ourselves with its past record, will excuse us to the reader, if we cautiously consider the future.

There can be no doubt that the name berberine is applied to the alkaloid by a comparatively small number of American pharmacists and physicians, and that in America the recognized name is still Rafinesque's "Hydrastine." The endeavor to affix the term berberine to this yellow alkaloid of *Hydrastis canadensis*, has as yet proven a commercial failure. It is true, that with scientific men and many writers, berberine is acknowledged, but these men are few, compared with those who use the term hydrastine. The question that naturally presents itself is, are the men who prefer hydrastine entitled to consideration? Although we support the term berberine, we must acknowledge the justice of the name hydrastine from the following reasons:

1. The name hydrastine was applied before the name berberine, the one in America (hydrastine), the other in Europe (berberine).

2. This substance and its salts, under the name hydrastine, hydrastine muriate, etc., came into extensive use in America, and so generally, that at the present day we estimate that from 25,000 to 28,000 pounds of *Hydrastis canadensis* are annually consumed in making the alkaloid and its salts. They are scarcely used in Europe.

3. This name (hydrastine) has become so strongly fixed in the trade interests of our country, that for this reason alone we would even now acknowledge its claims for primary recognition, were *our* country only to be considered.

* We thus see that the American history coincides remarkably with the European, for in 1824 Huttenschmid discovered berberine, and fifteen years afterward Kemp identified it as an alkaloid, although between those periods it had been discovered independently, and examined by several good authorities.

However, even though the name hydrastine is chronologically entitled to preference, and though the amount of the alkaloid produced from *Hydrastis canadensis* for medicinal use, in America, is doubtless very much greater than that from all other sources the world over, we think that the fact of its being familiar to scientists of all countries as berberine, now entitles that word to preference.

Throughout America the name hydrastine is as firmly engrafted as before Mahla (1862) announced that hydrastine and berberine were identical. There is little indication that the term hydrastine will be supplanted by berberine at any immediate day, yet in common with others we have always given our assistance towards bringing about this result. All have failed, and the public seems to tenaciously insist that commercial precedence, and the source of the drug, shall have precedence in the recognition of a name. Hence, in America the name berberine is applied by a few, and hydrastine by the many.

It is not unlikely, however, that if the leaders in the various schools of medicine and in pharmacy will endeavor to bring about uniformity in expression, and will use the word berberine whenever it is possible, it can be made the name of the future. *

Processes Announced for the Preparation of Berberine.—It would be natural to suppose that a substance of the importance of berberine, and studied as this substance has been during a number of years, could now be readily prepared in a state of purity. We will venture to say, however, that according to our investigations, the production of this alkaloid, free from contaminations and decomposition products, is by no means an easy matter. A personal experience of some years on a manufacturing scale by means of the formulas suggested, and accepted by many authors as reliable, has not been at all satisfactory. It is therefore necessary for us to review the processes that have been named; and while we dislike to differ, even in the least, with such excellent authorities as have considered this subject, we must not neglect to add any light that may have been cast in this direction by our work. We find, also, that others have not been altogether satisfied; and investigators who are no less conspicuous in the literature of berberine than Mr. Perrins and Prof. Wm. Procter, have doubted the constitution of the substances produced as berberine. Thus Mr. Perrins states that "the pure alkaloid itself is equally unsuited for analysis. . . . Indeed, I find it not easily prepared in a state of purity." And that Mr. Perrins was uncertain of the substance known to others as berberine, is evidenced by the fact that his ultimate analyses were all made of the salts of berberine. Prof. Procter, in referring to this subject, has written :†

* Few realize the hold of the word hydrastine in America. When we consider that it is applied to a proximate principle that has been used extensively for twenty years, and that the name gives the origin of the drug, we can appreciate the fact that it will be displaced very slowly. There is another argument against the word berberine, and that is the resemblance to *beberine*. These substances are often confused in commerce, and confounded by physicians, and that they so nearly resemble is unfortunate.

† American Journal of Pharmacy, 1864, p. 10.

"Having occasion recently for information relative to the production of pure berberine in an uncombined state, a reference to all the authorities at my disposal, including nearly all the papers published within the last few years, I noticed with some surprise that these writers, in describing berberine, treated the substance obtained from *Berberis vulgaris* by the agency of neutral solvents, and which, as berberine is an alkaloid, must be a neutral salt of that alkaloid."

The substance originally called berberine having been found a mixture of berberine and extractive matters, led to the suggestion of several processes for freeing this alkaloid from its combinations. Mr. Fleitmann announced the following:* "Sulphate of berberine was made by decomposing the muriate with weak sulphuric acid; the salt then recrystallized, and dried at 212°F to expel all traces of muriatic acid. Baryta water was added to the solution until it became alkaline, when the liquid immediately assumed a dark red color. To remove the excess of baryta, carbonic acid was passed through the liquid, which was then boiled and filtered, upon which the dark red solution was evaporated nearly to dryness in the water bath, and dissolved in ordinary alcohol; the berberine was precipitated by ether, and recrystallized from water."

This is the process now adopted by most of the authorities we have consulted, but we regard the product as uncertain and by no means of uniform composition. He first directs the preparation of muriate of berberine, and this salt is then to be dried at a temperature of 212°F . This preliminary step introduces a possible impurity, for we are convinced that such a temperature can not be applied to the moist salts of berberine without risk of partially dissociating them. In this view we find that our experiments have also corroborated those of Mr. Perrins, who writes of muriate of berberine as follows: "I acquiesced in Fleitmann's formula, and even supposed that it was confirmed by my analysis of the hydrochlorate and by a platinum determination; but later experience has shown me that the hydrochlorate is not suited for ultimate analysis, as by pretty long exposure to a temperature of 100°C ., or thereabouts, it undergoes some decomposition."

Next, we find that the addition of solution of caustic baryta until an alkaline reaction results, is a procedure that should be avoided if possible, and by no means should the alkali be added in great excess, for the equilibrium of this delicate alkaloid is likely to be disturbed by contact with excess of an alkali. Mr. J. Stenhouse noticed this dissociating power of the alkalies on berberine, and in the *Journal of the Chemical Society*, London, 1867, p. 187, he cautions us against their use, and considers caustic lime preferable to any of them as being less destructive.

Finally, the evaporation of the solution of berberine, after precipitation of excess of barium by a current of carbon dioxide, should not, in our opinion, be carried on at the temperature of a water bath, and most certainly not as Mr.

* *Chemical Gazette*, 1847, p. 129.

Fleitmann directs, "nearly to dryness." Such an application of heat, especially when continued in this manner, will decompose portions of the alkaloid.

Taking these factors together—and we doubt if many workers with this alkaloid will dissent concerning their several influences—we can not but accept that the product must be uncertain. Hence, while Mr. Fleitmann obtained a body which he found to possess certain characteristics, we are not surprised that others who have followed, and excellent authorities, differ both from him and from each other.

In 1862, Mr. Wm. S. Merrell stated that berberine might be prepared by decomposing sulphate of berberine by means of oxide of lead.* Acting on his suggestion, Prof. Wm. Procter elaborated a formula as follows:† Freshly precipitated oxide of lead, basic hydroxide, $\text{Pb}_2\text{O}(\text{OH})_2$, was digested in excess with sulphate of berberine, which had been previously dissolved in boiling water, until a filtered portion of the solution failed to strike a precipitate with solution of acetate of lead or with baryta water. It was then filtered, evaporated and crystallized.

This process seems certainly to be free from some of the objectionable features of those that have preceded, and yet (admitting that berberine can be produced) as a necessity there must be a long-continued application of heat; and this should be avoided.

Again, in our hands the process has been a complete failure in other respects, because it abstracts only a part of the sulphuric acid; and in support of our view we give a synopsis of the following experiments that we have repeatedly made.

One part (480 grains) of nitrate of lead was dissolved in water and precipitated with excess of ammonia water. The basic hydroxide so produced was well washed, and added to a solution of one part (480 grains) of berberine bisulphate ($\text{C}_{20}\text{H}_{17}\text{NO}_4\text{H}_2\text{SO}_4$), in 32 parts of water. The mixture was digested at a temperature of 160°F . for forty-eight hours, with frequent stirring, the evaporated water being replaced, and was occasionally tested with solution of acetate of lead.‡ The sulphuric acid was not withdrawn, the solution giving every evidence of being still a solution that contained a sulphate of berberine. If the liquid be evaporated to dryness, decomposition results; and upon re-solution a deep red liquid is produced, which still contains a sulphate of berberine after the lead is precipitated by means of sulphide of hydrogen. In this case, however, the sulphate conforms to the properties of the normal salt ($\text{C}_{20}\text{H}_{17}\text{NO}_4$) $_2\text{H}_2\text{SO}_4$.

Under the same circumstances lead monoxide, PbO , fails to withdraw the sulphuric acid from the bisulphate of berberine. We are convinced that Prof. Procter really obtained the soluble normal sulphate as we did with our

* American Journal of Pharmacy, 1862, p. 503.

† American Journal of Pharmacy, 1864, p. 10.

‡ Prof. Procter states that solution of caustic baryta can also be used to determine the absence of sulphate of berberine. We believe that the lead sulphate dissolves to a considerable extent in this solution of berberine; and hence we scarcely think that the barium test is reliable.

ammonia process, a compound that at that time was unknown. In this connection, we remember that Prof. Edward S. Wayne once informed us that in his hands the process was a failure.

In 1867, Mr. G. Stenhouse published in the *Journal of the Chemical Society*, London, a process in substance as follows:*

“One part of acetate of lead is dissolved in three parts of water, and to the boiling solution one part of very finely ground litharge is added in small portions, and heated until the whole forms a thick, pasty mass. This is then diluted with one hundred parts of water, and twenty parts of the finely ground wood is mixed with it and boiled about three hours, and strained. A little litharge is then added to the liquid, and it is evaporated to crystallization, when, ‘on cooling, berberine crystallizes out in dark brown tufts of needles.’

“In order to purify the crude berberine obtained by the foregoing process, it is dissolved in boiling water, and subacetate of lead added as long as any precipitate is produced. This solution, filtered while hot, almost solidifies on cooling to a mass of yellow needles, which, however, still contain lead and organic impurities. They are collected on a cloth filter, pressed, dissolved in boiling water, and sulphuretted hydrogen is passed through it. The hot solution, after filtration to separate the precipitated sulphide of lead which carries down some organic impurities, is acidulated with acetic acid and allowed to cool. The bright yellow needles of nearly pure berberine are collected, pressed, and dried at a gentle heat.”

This process will not produce berberine, but an acetate of berberine. Even if the treatment with solution of basic acetate of lead yielded berberine, it would be impossible to finish the product by acidulating the solution with acetic acid, as Mr. Stenhouse directs, and avoid the formation of acetate of berberine, which is in reality the substance produced by the process. Hence those who employed this formula can not well agree in their description of the product with persons who used the process of Mr. Fleitmann.

Dr. T. L. A. Greve, of Cincinnati, suggested a process in the *Eclectic Medical Journal*, 1877,† whereby muriate of berberine is decomposed by means of oxide of silver. This process certainly produces chloride of silver, with the separation of the chlorine from the alkaloidal salt, and the formation of a substance that dissolves with a deep red color, and which forms salts with acids.

Dr. Greve's plan is to make a boiling solution of muriate of berberine, and add oxide of silver in amount sufficient to decompose it. The reaction we find to be rather violent if moderately large amounts are used, and is accompanied by the evolution of gas bubbles and a hissing noise, even in the small proportions of a few grains. When we consider the unstable nature of oxide of silver when in contact with organic substances, we can not but question the production of pure berberine by this process. The result in our hands seems

* *Journal of the Chemical Society*, London, 1867, p. 187.

† *Eclectic Medical Journal*, Cincinnati, 1877, p. 312.

quite conclusive that oxidation products arise from the action of this powerful oxidizer on the berberine, and that the reaction is not so simple as to be altogether explained by a double decomposition between the two substances.

Lastly, the writer suggested that berberine could be prepared as follows: *
 “Rub eight parts of sulphate of berberine in a wedgwood mortar, cautiously adding ammonia water until in slight excess. Pour the dark liquid into thirty-two parts of boiling alcohol, and allow the mixture to stand thirty minutes; then filter. Stir into the filtrate thirty-two parts of cold sulphuric ether, and cover tightly. Surround the vessel with ice, and allow it to stand from twelve to twenty-four hours; then separate the magma of minute crystals of berberine with a muslin strainer or filtering paper, and dry by exposure to the atmosphere.”

This product is in reality a sulphate of berberine of the composition $(C_{20}H_{17}NO_4)_2 \cdot H_2SO_4$. At the time the process was announced, the writer considered the presence of sulphuric acid to be due to adhering sulphate of ammonium, but subsequent investigations have demonstrated that such is not the case; and the fact was announced in the *American Druggist*, 1884, Sep., p. 166.

After reviewing the published processes that have been brought to our attention, as announced in the foregoing pages, we must admit that this berberine subject is not in a satisfactory condition, and that the contradictory reports of those who have written on the properties of the alkaloid are doubtless mostly due to the variable condition of the product.

The Preparation of Berberine.—Our experiences with the processes that have been recorded having proved so unsatisfactory, and really in accord with the work of others, we have endeavored from time to time to obtain the alkaloid in a state of unquestionable purity. The most satisfactory process, but not by any means without objections, is based on that of Mr. Fleitmann—the decomposition of sulphate of berberine by means of solution of hydroxide of barium.† With the precautions that we suggest, a moderate proportion of a substance can be obtained that conforms to our description of berberine, and which we believe can be accepted as the pure alkaloid.

Make a saturated solution of sulphate of berberine $(C_{20}H_{17}NO_4)_2 \cdot H_2SO_4$ ‡ in distilled water, and at a temperature of 15.5° C. cautiously add solution of hydroxide of barium until in *very slight excess*. Pass a current of carbon dioxide at once through the product, until it ceases to afford a precipitate with a filtered portion of the liquid, and then filter it. Place this dark red solution of berberine in a shallow vessel, and expose it to dry air under a bell glass containing a vessel of sulphuric acid, chloride of calcium, or freshly burned

* J. U. Lloyd, in *Proceedings of the American Pharmaceutical Association*, 1878. See also *American Journal of Pharmacy*, 1879, p. 11.

† If carbonate of barium would decompose sulphate of berberine completely, the action of an alkali would be obviated. However, it will not do so.

‡ The salt used by Fleitmann and others has been the bisulphate of berberine $C_{20}H_{17}NO_4 \cdot H_2SO_4$. This is so nearly insoluble as to require heat. In order to evaporate the product, heat also is necessary in consequence of its dilute condition. We overcome this by making a cold, concentrated solution of the soluble sulphate.

lime. After the liquid has reached a syrupy consistence, a deep brown crust forms over its surface which is of rather uncertain composition, as it refuses to completely re-dissolve in water. However, deep garnet red, needle-like crystals form beneath it of considerable size, distinct and clearly defined. These bear no evidence of contamination, form salts to perfection, and in our opinion are pure berberine.

This process, it will be seen, presents the following advantages over others:

1st. A very soluble sulphate of berberine is employed, which enables us to obtain a cold, concentrated liquid.

2nd. By close attention the sulphuric acid can be all withdrawn with only a slight excess of caustic baryta, which must be immediately decomposed by means of a current of carbon dioxide.

3d. The final evaporation is without heat; and thus from the beginning to the close of the operation the temperature need not rise above 15.5° C.

Working with very small amounts has not been satisfactory. We prefer to employ not less than a pound of sulphate.

Identity of the Alkaloid (Berberine), as obtained from Hydrastis canadensis and Berberis vulgaris.—The differences in the description of berberine has led some persons to question the identity of the substance as derived from different sources. While it is true that processes that will separate certain salts of berberine from some plants, fail to do so with others, we are convinced that this is in consequence of the natural combination of the alkaloid or the influence of associated bodies. In our hands, after purification, the alkaloid known as berberine is identical in properties, whatever has been its origin. The sulphate, muriate, and other salts of berberine as obtained by us from Hydrastis, conform in character with the same substances made from Berberis vulgaris.

In the year 1862, Dr. F. Mahla, of Chicago, presented a paper* on the substance used by Eclectic physicians under the name Hydrastine.† From the reaction of its salts, and also by the support of an elementary analysis, he decided that it was the well known alkaloid berberine. He believed himself to have been the first to enter this field, for he wrote: "An organic elementary analysis of this substance‡ does not exist;" but at the same time Mr. Perrins, of London, England, was engaged in a similar investigation of the yellow alkaloid of Hydrastis.

Mr. Perrins, after enumerating a number of plants of different natural orders, accepted as indisputable the fact that they all contain the alkaloid berberine. He is undoubtedly our best authority on this subject. He included Hydrastis canadensis, and wrote as follows before entering into the elaborate analyses he made of the berberine salts:§ "It seems unnecessary to

* American Journal of Science and Arts, Jan., 1862.

† See our history of the yellow alkaloid from Hydrastis canadensis.

‡ As made from Hydrastis canadensis.

§ Journal of the Chemical Society, London, 1862, Vol. XV., p. 343.

state in each case from which plant I have prepared the salt for analysis; suffice it to say that the whole of the sources now first announced are included."

Mr. Perrins did not advance his method of comparison; and although there can now be little, if any, doubt that his assertions were based on experimental proof, we feel that our paper would be less perfect were we to neglect the subject.

Therefore we forwarded specimens of perfectly pure and re-crystallized sulphate and bisulphate of berberine to Prof. F.B. Power and Prof. Virgil Coblentz, and to the latter gentleman a specimen of crystallized berberine, all from *Hydrastis canadensis*. These substances were analyzed by Prof. Coblentz, who, after several combustions, assigned to each alkaloid the formula $C_{20}H_{17}NO_4$. Prof. Power made combustions of the bisulphate only, and also reported the empirical formula $C_{20}H_{17}NO_4$. In view of these facts, we think it can be accepted beyond a doubt that the yellow alkaloid of *Hydrastis canadensis* is identical with that of *Berberis vulgaris*, and is berberine.

The Composition of Berberine ($C_{20}H_{17}NO_4$).—The history of the trials through which this alkaloid has passed must be continued to its chemistry. Indeed, it would seem strange if a substance that has gone through so many other vicissitudes should not have met with troubles in this department.

Prof. Buchner (1835) first assigned to berberine the formula $C_{33}H_{18}NO_{12}$ (old notation).

In 1847, Thos. Fleitmann redetermined it from the analysis of berberine prepared by himself, the result being $C_{42}H_{18}NO_9$ (old notation).* He thought that the discrepancy between himself and Prof. Buchner probably resulted from the fact that Buchner examined an impure muriate of berberine. This paper led to a communication from Dr. George Kemp, † who, taking exception to Mr. Fleitmann's calculation, argued from Fleitmann's own analysis that the formula announced could not be correct. He therefore recalculated the formula from the figures of Mr. Fleitmann, and announced that $C_{40}H_{17}NO_9$ (old notation) more nearly agreed with the result of the analysis. ‡ However, from an analysis of the double chloride of berberine and platinum, he obtained the formula $C_{42}H_{17}NO_7$ (old notation).

Dr. Bödeker followed this with a communication to Liebig's *Annalen*, lxi., p. 37, in which, from an analysis of berberine made from Columbo, he agreed with Fleitmann that it is $C_{42}H_{18}NO_9$ (old notation).

Again, Dr. Hinterberger, 1852, from an analysis of the double chloride of berberine and mercury, and Kehl & Swoboda, 1853,§ from an analysis of a double salt of cyanide of mercury and muriate of berberine, both agree with Fleitmann's $C_{42}H_{18}NO_9$.

* Chemical Gazette, 1847, p. 129.

† Chemical Gazette, 1847, p. 209.

‡ Gerhardt also noted the discrepancy in Mr. Fleitmann's formula, and proposed the formula $C_{33}H_{18}NO_{10}$. As shown by Mr. Perrins afterward, Mr. Fleitmann's formula was already too high in carbon.

§ Chemical Gazette, 1853, p. 70, from *Ann. der Chem. & Pharm.*, lxxxiii., p. 339.

This was the unsettled condition of affairs when Mr. J. Dyson Perrins (1862) contributed his paper on the berberine question.* After reviewing the work of others, he very modestly states that "It is not without some hesitation that I allow myself to question the conclusions of chemists of the eminence of Fleitmann, Bodeker, and others; but my own results are so accordant with each other, the number of analyses I have made, and the variety of combinations I have examined are so considerable, that I feel not only justified in proposing an alteration of the formula, but, indeed, compelled to do so." He argues against Mr. Fleitmann's formula, as others had done, from his (Fleitmann's) own analysis, and says that "the numerical results . . . support the formula I propose rather than his own."

Mr. Perrins then presented the combustion of many salts of berberine, and ascribed to the alkaloid the formula $C_{40} H_{17} NO_8$ (old notation), which is accepted to-day; and we have $C_{20} H_{17} NO_4$ of the new notation.

That this formula is correct, has been settled beyond a doubt. Prof. Ernst Schmidt, of the University of Halle,† states that it is $C_{20} H_{17} NO_4$, as shown from numerous analyses, made of the pure base, the sulphate, hydrochlorate and nitrate; also from an examination of the hydroberberine. And lastly, we call attention to the combustions made by Prof. F. B. Powers and Prof. Virgil Coblentz (p. 105) of the berberine made by us from *Hydrastis canadensis*.

Properties.—‡Berberine crystallizes in tufts of dark brown-red needles, figure 31 representing the appearance of these crystals when slightly magnified. The crust that forms over the surface of the liquid is of a dark brown color. If a concentrated solution of berberine in alcohol be mixed with four parts of sulphuric ether a semi-crystalline magma of an orange yellow color is deposited.



FIG. 31.

Crystals of Berberine,
slightly magnified.

Micro-crystals of this are not so clearly defined and the salt is less soluble than the pure crystallized berberine. In connection with this subject we present (next page) figures 32 and 33, micro-drawings made by Mr. William J. Huck, under the personal supervision of Prof. F. B. Power, of the Department of Pharmacy, University of Wisconsin,§ from specimens of berberine prepared by us in the manner we have stated. Prof. Power contributes as follows:

"The alkaloid was presented in two forms, as a lemon yellow precipitate (made by precipitation with ether.—Ed.) without distinct crystalline structure, or as a reddish-brown crust, with a darker and somewhat crystalline exterior. Neither of these forms, however, admitted of exact representation, and the crystalline coating upon the crust, after being detached and brought under the

* Journal of the Chemical Society, London, Vol. XV., 1862. p. 339.

† Berichte der Deutschen Chemischen Gesellschaft, 1883. No. 15, p. 2589.

‡ The berberine herein described was made according to our process and recrystallized from cold water over sulphuric acid. It responded to all tests for purity, was free from sulphuric acid, soluble in both water and alcohol.

§ Figures 32, 33, 34, 36, 37, and 38 are all the work of these gentlemen and prepared for our publication.

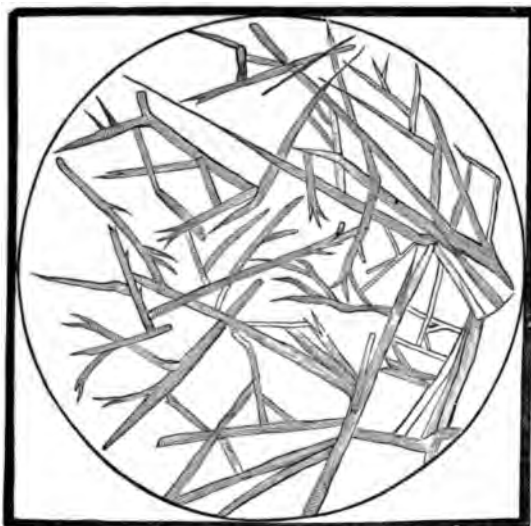


FIG. 32.

Crystals of Berberine (magnified 300 diameters).

microscope, showed such an imperfect aggregation that a drawing would be of little value. To obtain better crystals, both the yellow precipitate and a portion of the dark-colored crust were therefore dissolved in absolute alcohol, and the solutions allowed to evaporate directly upon an object glass.

"Fig. 32 represents the alkaloid berberine as precipitated from alcoholic solution by means of ether, crystallized upon an object glass, and magnified 300 diameters.

"Fig. 33 represents the reddish-brown crust of the alkaloid berberine as crystallized upon an object glass, and magnified 300 diameters.

"Neither of these show a definite crystalline form, while the crystals of Fig. 32 are especially irregular and much branched."

Berberine has a pure and lasting bitter taste and is odorless. It should dissolve without residue in both water and absolute alcohol.

Solubilities. — A reference to our history of the alkaloid berberine will render it unlikely that a name can be applied to so many different substances and these bodies have an accepted solubility. We find, therefore, that the solubility of berberine is stated to be all the way from one part in eighty of water, to one part in five hundred of water. According to our experience berberine varies in solubility in accordance with the proportion of the liquid to alkaloid and time of exposure, and we do

not doubt that even with the same specimens different experiments will obtain discordant results. In presenting the following we will therefore say that a contact of one hundred hours was permitted in a closely-stopped bottle

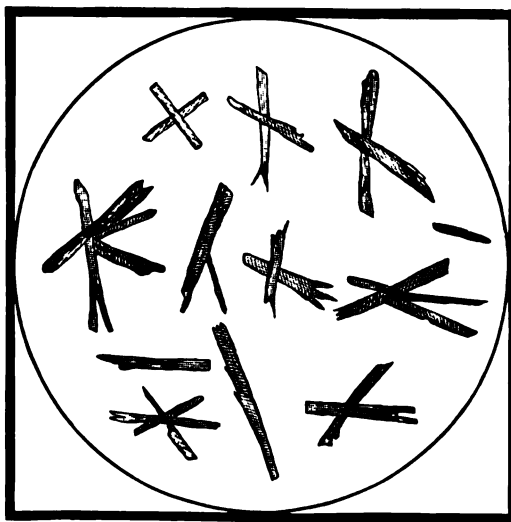


FIG. 33.

Crystals of Berberine, (magnified 300 diameters).

between the liquid and an excess of one-eighth its weight of undissolved berberine at a temperature of 15.5°C . The mixture was shaken frequently, and after perfect subsidence of undissolved matter, the clear overlying solution was decanted, weighed, evaporated at an ordinary temperature by exposure to dry air, and the residue weighed and deducted from the weight of the solution. We used one ounce of berberine in each experiment.

Forty-five and one-fifth parts by weight of the solution of berberine in anhydrous alcohol yielded 6.7 parts of dry berberine.

Thirty-three and one-seventh parts of the solution of berberine in water yielded 1.9 parts of dry berberine. Consequently, one part of berberine dissolved in 6.79 parts of absolute alcohol and in 17.77 parts of water. It readily forms super-saturated solutions with both alcohol and water.

Berberine is practically insoluble in sulphuric ether, chloroform, carbon disulphide and benzol.

Decomposition Products of Berberine.—These are not of great interest to physicians or pharmacists, but we will briefly review the important features of the work that has been done in this direction. Fleitmann found that when berberine is heated from 160° to 200°C . vapors were evolved that condense to an oily liquid, which dissolves in alcohol and is precipitated from such solution by acetate of lead and by water. Hlasiwetz heated berberine in a sealed tube with water, and obtained a substance of a red color and a bronze-like luster by transmitted light, and a green color by reflected light. He added sodium amalgam to a boiling solution of berberine and produced a hydro-berberine of basic reaction of a yellow color and the formula $\text{C}_{20}\text{H}_{21}\text{NO}_4$. This formula has been confirmed (1884), by E. Schmidt,* who states that from its behavior with ethyl iodide, hydro-berberine must be a tertiary base. This author also formed berberine hydriodide by treating berberine with iodide of ethyl; and produced a dibasic acid $\text{C}_{10}\text{H}_{10}\text{O}_6 + 2\text{H}_2\text{O}$, by oxidizing berberine with an alkaline permanganate, which he considered identical with hemipinic acid.

Mr. O. Bernheimer† obtained as volatile products, ammonia and quinoline‡ by heating berberine in a retort with five times its weight of caustic potash. The residue was found to contain two acids which in properties agree with the acids announced first by Hlasiwetz and Gilm. One of these acids was supposed by H. and G. to be protocatchuic acid, and in this connection it is well to call attention to the fact that the alkaloid Hydrastine yielded protocatchuic acid when treated by Prof. B. F. Power with excess of caustic potash. Bernheimer obtained a yellow crystalline mass by heating hydro-berberine with methyl iodide in a closed tube which crystallized in the trimetric system from boiling methyl alcohol. This has the composition $\text{C}_{20}\text{H}_{21}\text{NO}_4$, Me I. and when suspended in water and treated with oxide of silver pro-

*Journal of the Chemical Society, 1884, March, p. 339.

‡Hlasiwetz and Gilm suggested that this substance was formed under these circumstances, and Bodeker had also previously announced that distilling berberine with either milk of lime or oxide of lead produced quinoline.

†Journal of the Chemical Society, March, 1884, p. 340 from "Gazzetta" 13, 342-347.

duced a crystalline hydroxide of the composition $C_{20}H_{21}NO_4, Me HO + H_2O$. This is strongly basic, liberating ammonia from solution of ammonium chloride. The hydroxide decomposes when heated in a sealed tube, eliminating methyl alcohol. Mr. Bernheimer concluded that hydroberberine is a tertiary base.

The same author found that by heating berberine, methyl iodide and methyl alcohol together a methiodide $C_{20}H_{17}NO_4, Me I$, was produced.

On treating this with silver oxide, the corresponding hydroxide was formed, similar in properties to the hydroberberine compound.

Fleitmann announced (1847) that a solution of sulphur in sulphide of ammonium; mixed with a solution of hydrochlorate of berberine, produced a brown-red precipitate of a repulsive odor. This he washed and found still to contain sulphur, but he stated that it did not yield sulphide of hydrogen by treatment with hydrochloric acid. Mr. Bernheimer, upon the contrary, found this precipitate to be decomposed under these conditions with the evolution of sulphide of hydrogen, and the result proved to be hydrochlorate of berberine free from sulphur. He therefore assumes that the precipitate is probably a persulphide of berberine. Hydriodide of berberine ($C_{20}H_{17}NO_4, HI$) was produced by heating hydroberberine with iodine, both being in chloroformic solution. It is soluble in alcohol.

Salts of Berberine.—Berberine is a strong base and unites with acids, forming in many instances most beautiful crystalline salts. These salts of berberine are, as a rule, decomposed by the excess of an acid solution, especially if heated, and hence for example the muriate of berberine forms the sulphate when boiled with diluted sulphuric acid, although under like conditions the alkaloid has a stronger affinity for muriatic acid. It is obvious that the larger number of these compounds are not of interest to our readers, but a few are used in medicine and quite extensively. Some of these have interesting records, and in view of their positions in the history of the alkaloid berberine we were compelled several times to refer to them while considering that alkaloid. In this connection we will say that the early history and pharmacy of these substances has never to our knowledge been presented to the public, and we feel that in these pages it is accurately recorded for the first time.

MURIATE OR HYDROCHLORATE OF BERBERINE, $C_{20}H_{17}NO_4 \cdot HCl$. Crystallized, $C_{20}H_{17}NO_4 \cdot HCl + 2H_2O$.—The introduction into American medicine of the salts of berberine was an outgrowth of the introduction of the "concentrations" of early Eclecticism, and intimately connected with it. Therefore, we shall introduce muriate of berberine by the historical connection.

The preparation of podophyllin (Resin of Podophyllum, U. S. P.) in 1847* led to the preparation by similar processes of other materials from *Cimicifuga racemosa*, *Veronica virginica*, *Sanguinaria canadensis*, *Cypripedium pubescens*, and *Hydrastis canadensis*.* All of these substances were first

* See Eclectic Medical Journal, Cincinnati, January, 1849, p. 1, and compare statement of Wm. S. Merrell in American Journal of Pharmacy, 1862, p. 496.

made after the method employed in preparing podophyllin, by simply evaporating the alcohol from a tincture of the respective drug, and then pouring the creamy liquid into cold water. The precipitate, if it were capable of drying, was powdered and sold in that form; but if it was an oleoresin, it was distinguished as a "soft concentration." In an advertisement before us of August, 1852, we note, under the heading of "Concentrations":

"Powders.—Podophyllin, Leptandrin, Macroton, Myricin, Sanguinarin, and Hydrastin.*

"Soft Concentrations.—Ptelein, Apocynin, Eupatorin, Asclepedin."†

Thus it happened that because podophyllum chanced to yield an active medicinal agent by this method, it was accepted that other similar substances would necessarily prove to be valuable, and Hydrastis was included. However, it was soon found that the precipitate, so-called Hydrastin, neither retained the sensible nor medicinal properties of Hydrastis. It is true that it had a yellow color, and was bitter; but the overlying liquid beyond a doubt contained the valuable constituents of the drug. These obvious facts led to experiments having for their object the separation of the real characteristic principles. After repeated trials, it was found that the addition of muriatic acid to the supernatant liquid (from which the so-called hydrastin had been precipitated) produced a brilliant yellow precipitate, that was very bitter, and seemed to possess the greater part of the sensible properties of the rhizome of Hydrastis. This was introduced into medicine as hydrastin neutral, to distinguish it from the former resinous substance known as hydrastin.‡

The introduction of this second substance inaugurated a confusion in nomenclature that, with the products of Hydrastis, has remained even to the present day. We find the two materials recorded in the prices current of the three principal manufacturers of those times, under three names, to-wit:

MAKER.	RESINOUS PRECIPITATE.	MURIATIC ACID PRECIPITATE.
No. 1.	Hydrastin.	Muriate of Hydrastin.
No. 2.	Hydrastin.	Hydrastin Neutral.
No. 3.	Hydrastin.	Hydrastine.

Thus it is that muriate of berberine was the first salt of the alkaloid used in American medicine, and was at first known by three names. Indeed, it was eventually known by four, because in a short time the resinous precipitate called hydrastin dropped from use, and the term hydrastin became affixed to this substance, muriate of berberine.

Eventually the name hydrastine neutral§ was lost, and this muriate of

* These substances were mentioned by the late Wm. S. Merrell in the Eclectic Medical Journal, Cincinnati, July, 1852, p. 297. We have found no earlier record outside of the discovery of podophyllin by Prof. John King some years previously.

† Afterward the more appropriate term oleoresin was given to the "soft concentrations."

‡ See the first edition of the Eclectic Dispensatory, King & Newton, 1852, p. 214.

§ In those days this term was not so inappropriate. There was no known salt of muriatic acid and an alkaloid, of a practically insoluble nature, and consequently the salt was first thought to be an inactive chemical body which was thrown out of solution by the acid. We also call attention to the fact that Buchner and Herberger obtained the same substance, and regarded it as a weak acid or neutral principle.

berberine remained, for a considerable time, in American medicine under the names hydrastin, hydrastine, and muriate of hydrastine.*

It will be seen from this review of the early history of the substances derived from *Hydrastis canadensis*, that the first definite principle introduced into American medicine was the muriate (hydrochlorate) of berberine. The reader will also note that this was in reality a salt of berberine, for (see our history of the alkaloid berberine) Mahla† demonstrated their identity, and Mr. Wm. S. Merrell immediately accepted the statement of Mr. Mahla regarding the substance that he (Merrell) had sold as hydrastine neutral. In the *Eclectic Medical Journal*, April, 1862, (Mr. Mahla having made the statement in January, 1862,) Mr. Merrell writes: "The fine yellow powder which we have heretofore sold as hydrastine neutral proves to be a true muriate of the hydrastia." He afterwards, in the *American Journal of Pharmacy*, stated that the alkaloid known as hydrastine was identical with berberine. Thus it is that throughout the length and breadth of this country, hydrochlorate of berberine at the present day is recognized as muriate or hydrochlorate of hydrastine, and in this connection we refer the reader to our history of berberine.

The Alkaloidal Nature of Muriate of Berberine.—It is generally accepted that the identification of this substance as obtained from hydrastis was first made by Mr. Mahla in 1862 (see p. 99), but in reality he only announced that it was the same as muriate of berberine. It had been placed under the name hydrastine muriate with the alkaloids ten years or more before that, and described in language so expressive, that the definition would be a fair one at the present day. In support of our view of this matter, we quote from "Positive Medical Agents," by Grover Coe, 1855 (written before 1854), as follows:

"*Hydrastine*. This is the alkaloidal principle of *Hydrastis canadensis*. *Hydrastin* is a resinoid which is obtained from *Hydrastis canadensis*. As the reader may wish to know why we name these distinct principles so nearly alike, it may not be improper to give the required information at this point. The resinoids and alkaloids, being clearly distinct, and yet often derived from the same plant, it has been thought best to give the generic name of the plant to the active or concentrated principles, ending them in "*in*" when the active principle is of a resinoid character; and in "*ine*" when of an alkaloid character; thus we have *hydrastin*, a resinoid; and *hydrastine*, an alkaloid."

It will be seen that, while Mr. Mahla announced the identity of berberine with this yellow alkaloid of hydrastis, he was not the first to find its alkaloidal nature as obtained from hydrastis.‡ In considering the matter further, we

* Afterward another link was added to this unfortunate chain of names by the introduction of "Principles Combined hydrastin." This is a mixture of various substances, and is expected to represent all the peculiar constituents of hydrastis. It is now the only substance recognized simply as hydrastin or hydrastine, these names having, by common consent of manufacturers, been affixed to it exclusively.

† *Am. Journ. Science and Arts*, Jan., 1862, and *Am. Journ. Pharm.*, 1862. p. 141.

‡ See page 98.

note that the nomenclature then adapted agrees with that now recognized by scientists, the alkaloid terminating in *ine*.

Preparation of Muriate (Hydrochlorate) of Berberine.—This salt can be made by precipitating either an aqueous or an alcoholic percolate of hydrastis with an excess of hydrochloric acid. In each case considerable amounts of the impurities are thrown down with the crystalline magma, which can only be completely freed from these associations by repeated crystallizations from both boiling alcohol and boiling water. Therefore it is that we prefer to prepare muriate of berberine from the di-berberine sulphate (by which process no heat is necessary), for it is best to avoid an extended application of heat. If, however, the process adopted be that of the direct production of muriate of berberine from the percolate of hydrastis, a considerable excess of muriate acid is necessary to dissociate the natural combination in which berberine exists, and simply bringing the liquid to an acid reaction, will only throw down a portion of the alkaloid.*

We therefore introduce the following process, announced first by us in 1878: †

Dissolve di-berberine sulphate ‡ ($C_{20}H_{17}NO_4 \cdot 2H_2SO_4$) in sixteen times its weight of distilled water, and cautiously add hydrochloric acid until in slight excess; drain the precipitate, wash it with distilled water until free from sulphate and muriate of ammonium, and then dry it by exposure to the atmosphere. If desired in crystalline form, dissolve it in boiling alcohol and permit the solution to cool. Hydrochlorate of berberine, made by precipitation, is an odorless, bright, lemon yellow, crystalline powder. When crystallized from hot alcohol by rapid cooling, and then dried, it is in the form of light-yellow, delicate, soft, silky needles, so fine in texture, that a mass of the salt is spongy and cotton-like to the touch. If the crystals are larger, the color is darker, and when of considerable size, they are of a deep orange. Figure 34 (next page) represents a micro-drawing of this salt (prepared by us), drawn by Mr. Huck, under the supervision of Prof. Power, who writes: "Berberine hydrochlorate ($C_{20}H_{17}NO_4HCl + 2H_2O$) was mounted in Canada balsam and magnified 60 diameters. The crystals have the form of distinct acicular prisms, and resemble very much in form the mono-berberine sulphate, but are relatively much larger."

Nitric Acid, Action on Hydrochlorate of Berberine.—Fleitmann states that, when hydrochlorate of berberine is added to strong nitric acid, a dark-red solution is formed, and that the application of heat to this solution causes effervescence with liberation of nitric oxide (NO), and that when the nitric oxide escapes, the liquid changes to a lighter color. These statements are supported by our investigations, and we find that if a considerable proportion of hydrochlorate of berberine is used, and the heat continued until the solution changes

* See our remarks under Hale's Third Alkaloid of hydrastis.

† Proceedings American Pharmaceutical Association, 1878. Also American Journal of Pharmacy, 1879, January, p. 11.

‡ At that time we supposed this to be berberine.

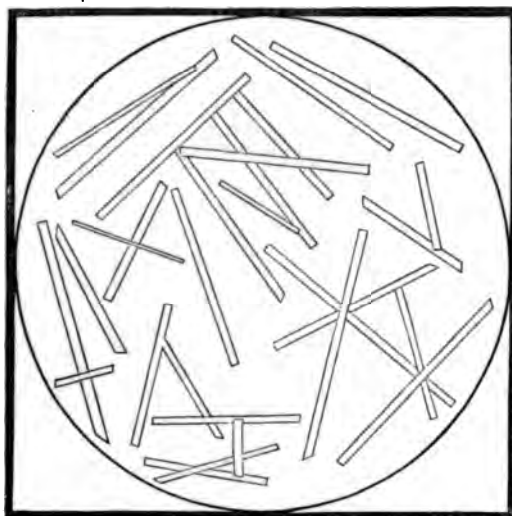


FIG. 34.
Crystals of Berberine Hydrochlorate, (magnified 60 diameters).

from dark-red to orange, the liquid will be transparent and syrupy. The liquid which results, mixes with alcohol, hydrochloric acid, nitric acid and officinal ether, but not with chloroform or benzol. With ammonia-water, it forms a dark-red liquid, and this will mix with water. Sulphuric acid also forms with it a dark-red solution, but this quickly changes to orange, with the evolution of gas bubbles. When diluted with water, an abundance of a yellow precipitate (*b*) results, which, when dry, presents the following characteristics: This precipitate is very bitter pulverulent at ordinary temperatures, but falls into a brittle mass when heated. It dissolves in officinal alcohol and ether, (but not in concentrated ether), forming in both instances orange-colored liquids, which stain organic matters yellow. Solutions of the hydroxides of potassium, sodium and ammonium, dissolve it, dark-red liquids resulting, which mix with water and alcohol in all proportions. The foregoing reactions would lead to the inference that this substance might be picric acid, but it is distinguished by the following properties: It is insoluble in chloroform and benzol. Its solutions do not precipitate with solution of ammonio-sulphate of copper, hydroxide of potassium, nor with solution of cinchonine in diluted sulphuric acid; and it gives no reaction with cyanide of potassium. Fleitmann calls it a yellow, difficultly soluble wax. Mr. H. Weidel has studied the oxidation products of berberine, and described berberonic acid, formed by the action of nitric acid on berberine, which can not be identical with this body, as he describes it as colorless, glassy crystals.*

Oxalic acid is another product of the action of hot nitric acid on hydrochlorate of berberine, and this is contained in the filtrate which passes when the precipitate (*b*) is separated. Both Henry and Buchner identified oxalic acid, and Buchner states that he obtained *only* oxalic acid as a result of the reaction. According to our experiments, the oxalic acid is in small amount, but if the proportions of the ingredients are varied, there might be a different result. In addition to the substances we have named, a yellow coloring matter results during the reaction between hot nitric acid and hydrochlorate of berberine, and this is soluble in water, alcohol, dilute acids and dilute alkalies. These decomposition products deserve further consideration.

* We have access only to a summary of this paper, and therefore can not review it as we would like.

Sulphuric Acid, Action on Hydrochlorate of Berberine.—Sulphuric acid dissolves hydrochlorate of berberine with production of a lemon-yellow liquid, which, when heated, darkens, changes to a greenish brown, and finally to dark brown. When the solution of hydrochlorate of berberine in cold sulphuric acid is permitted to stand, it changes to yellowish-brown. There is a difference in statements concerning this reaction, for according to Buchner, the resultant solution is greenish-yellow; Chevallier and Pellatan, red-brown; and Pölex, violet-red. Our experiments were made with the perfectly pure salt.

Hydrochlorate of berberine is dissociated when boiled with an excess of dilute sulphuric acid, bi-sulphate of berberine and hydrochloric acid resulting. This was part of Fleitmann's process for making the alkaloid (see page 101). If the amount of berberine hydrochlorate be great, a considerable proportion of the resultant bi-sulphate remains undissolved in consequence of the slight solubility of the salt in dilute sulphuric acid, even if hot. Ammonia water dissolves it immediately, the solution conforming to all the reactions of di-berberine sulphate.

Fleitmann states that the "reddish yellow" solution of hydrochlorate of berberine turns pale yellow on the addition of dilute sulphuric acid, and that the mixture, after a time, deposits delicate, pale, reddish-yellow needles. According to our investigations, a cold saturated solution of hydrochlorate of berberine is greenish-yellow, instead of "reddish-yellow," which latter color indicates the presence of impurities. When acidulated with sulphuric acid, it deposits minute lemon-yellow (instead of reddish-yellow) crystals, which dissolve at once when the liquid is rendered alkaline with ammonia water, thus showing that cold sulphuric acid in excess will decompose muriate of berberine with the production of a sulphate.

Hydrochloric Acid, Action on Hydrochlorate of Berberine.—Cold hydrochloric acid dissolves only traces of hydrochlorate of berberine, but, more freely upon boiling, forming a lemon-yellow liquid. The salt is not decomposed, and it crystallizes when the boiling solution cools.

Acetic Acid, Action on Hydrochlorate of Berberine.—Cold glacial acetic acid dissolves small amounts of hydrochlorate of berberine, and freely when boiling. A crystalline deposit forms when the hot liquid cools.

Hydroxide of Ammonium, Action on Hydrochlorate of Berberine.—Cold ammonia water dissolves small amounts of hydrochlorate of berberine apparently without decomposition, for the solution has the light yellow color of a solution of hydrochlorate of berberine. When boiled with an excess of ammonia water, an orange-colored liquid results, and upon further boiling a slight brownish precipitate is thrown down. It is apparent that the heated ammonia first liberates a small amount of berberine, which dissolves with the orange color, and is then partly decomposed, with production of the brownish substance. Upon cooling such a solution, an abundance of yellow crystals results, which, according to our examination, contain hydrochloric acid, and conform to the reactions of hydrochlorate of berberine. Schaffner states that warm ammonia

water forms a dark brown liquid with hydrochlorate of berberine, from which brown crystals are deposited upon cooling, a reaction we were unable to verify. Buchner and Schaffner supposed that ammonia combined with berberine under these circumstances, but we have not been successful in uniting them.

Hydroxide of Potassium or Sodium, Action on Hydrochlorate of Berberine.—Dilute boiling solutions of these alkalies dissolve hydrochlorate of berberine with liberation of berberine. This is shown by acidulating with sulphuric acid, whereby mono-berberine sulphate is produced. Concentrated hot solutions of these alkalies decompose the berberine, with production of a yellow resinous substance, almost insoluble in water. (See also decomposition products of berberine, p. 109). Hot dilute alcoholic solution of caustic potash acts like the aqueous solution of this alkali.

The carbonates of sodium and potassium, in dilute or concentrated solution, act like the alkalies.

Solubilities.—100 parts of distilled water, with one-eighth part of the undissolved salt, dissolved .204 parts of the hydrochlorate. Under the same conditions 100 parts of officinal alcohol dissolved .400 parts of the salt and 100 parts anhydrous alcohol dissolved .320 parts. It is practically insoluble in ether, chloroform or carbon disulphide.

Incompatibles.—The intense affinity that hot hydrochloric acid has for berberine renders this salt exceedingly stable, and, as we previously stated, led the discoverers to view it as a neutral body, or a weak acid. Consequently, it is not dissociated as easily as other alkaloidal salts. Boiling with excess of the mineral acids displaces the hydrochloric acid with the other. Solutions of the salts of silver decompose it immediately, and this is true of oxide and phosphate of silver, especially at high temperatures.

Hydrochlorate of berberine is mostly precipitated from aqueous solution by the addition of either hydrochloric or nitric acid, and largely, but less quickly, by sulphuric acid. Upon boiling with an excess of these acids, it is dissociated. Its aqueous solution is not precipitated by acetic acid, nor immediately by phosphoric acid (H_3PO_4). The solutions of many salts produce precipitates, among which may be named potassium cyanide (yellow), potassium ferrocyanide (dirty green), potassium chromate (yellow), and potassium iodide (yellow). It is not precipitated by either magnesium sulphate, copper sulphate, or ammonium oxalate.

Solution of picric acid and the soluble picrates precipitate the berberine completely from solution of hydrochlorate of berberine, with production of the insoluble picrate of berberine.

MONO-BERBERINE SULPHATE—BISULPHATE OF BERBERINE $\text{C}_{20}\text{H}_{17}\text{NO}_4 \cdot \text{H}_2\text{SO}_4$.—This substance was introduced into medicine in America under the name Sulphate of Hydrastine. There are two sulphates of berberine (see di-berberine sulphate and phosphate of berberine), but as this is the one that has always been used under the name, it is the only sulphate recognized in commerce. Its medical value seems to be exactly that of muriate of berberine,

but owing to its more soluble nature, it has nearly displaced that salt from market. Sulphate of berberine has been a favorite with physicians ever since its introduction.

Owing to the fact that this substance can be purified without the application of heat, and that it readily forms a soluble di-berberine sulphate by the action of dilute alkalies, from which other salts are easily prepared, we prefer to make this sulphate, and from it produce the various combinations.

Preparation.—Moisten any convenient amount of powdered hydrastis with officinal alcohol, and pack the powder properly in a suitable percolator which has previously been prepared for percolation. Exhaust the powder with alcohol, conducting the operation until the percolate does not contain enough berberine to repay the expense of manipulation and the loss of alcohol.* Reduce the temperature of the percolate to 50° F. (10° C.), and then gradually stir into it a decided excess of sulphuric acid. The natural combination of the alkaloid will be overcome, and a magma of fine crystals of berberine sulphate will immediately result. Permit the vessel to remain in a cool location for twenty-four hours, and then collect the sulphate of berberine on a filter or strainer of muslin.† Reserve the filtrate for the preparation of the white alkaloid.

The sulphate of berberine at this stage of the operation is impure, being contaminated with free sulphuric acid, sulphate of calcium, a greenish oil which exists to a considerable extent in hydrastis, and with some other foreign substances.

Wash the sulphuric acid from the precipitate by means of cold alcohol; dry the precipitate, and mix it with sixteen times its weight of water; add ammonia water until in excess; allow the solution to stand a few hours, and then filter it. Add to the filtrate a slight excess of sulphuric acid, and collect the precipitated mono-berberine sulphate on a filter. Repeat this operation twice, and then dissolve the salt in boiling alcohol and crystallize it.

Description of Mono-Berberine Sulphate.—Excepting chromate of berberine, this sulphate of berberine is the darkest salt of the alkaloid known to us. When crystallized from a quickly cooled solution in boiling alcohol it forms beautiful groups of acicular crystals which, from their small size, have an orange yellow color. If the solution is less concentrated, and crystallization is conducted more slowly, the crystals are larger and of a deep orange color. When the crystals are of considerable size, an inch in length and an eighth of an inch in diameter, the natural color of the salt is that of a ruby, deeper than bichromate of potassium.

* There can be no regular rule given for operations of this kind. The fineness of powder, packing of percolator, and temperature, influence the process to a considerable extent.

† When a concentrated aqueous extract of hydrastis in large amount is precipitated with excess of sulphuric acid, a finely divided, grainy precipitate of mono-berberine sulphate results. After this has subsided, white, needle-like crystals shoot out from the sides of the vessel and from the surface of the precipitate, which, when collected, washed with water, and dried, present a satin-like appearance. These are sulphate of calcium, and an examination of the precipitated sulphate of berberine, will show it to be largely contaminated with this substance which is also thrown down with it.

From what has been said it will be seen that the size of the crystals will alter the appearance of the salt. This may partly account for the discrepancy which exists in the writings of our authorities. In addition, the application of heat, as we have stated, will change the color, such action being undoubtedly accompanied by decomposition products. If an alcoholic solution be slowly cooled, crystallization commences with the formation of needle-like crystals, which, under certain conditions, will retain their characteristics until they cease to form. Under other circumstances, however, fan-like plates, resembling wasp wings, shoot out in most beautiful clumps, and, finally, perhaps another class of crystals will appear, consisting of granular nodules. These various forms are all sulphate of berberine, modified in appearance by different conditions of the solution and they are not different alkaloidal salts, a supposition once entertained by the writer. Upon separating them from each other, and severally dissolving them, all the modifications may crystallize from each solution, or the needle-like crystals may grow into the fan shape.

Figure 35 represents the micro-crystals of mono-berberine sulphate, prepared by us, and drawn for this publication by Mr. W. J. Huck, under the supervision of Prof. F. B. Power, of the Wisconsin University. They were mounted in glycerine, and were in the form of distinct acicular prisms.

Mono-berberine sulphate is odorless, and imparts to the taste a pure, persistent bitterness, which is devoid of the nauseating properties of such substances as quassia or aloes. When the fine orange-yellow crystals are gently heated, they darken and change to a deep orange, but resume their original hue when the salt is cooled. It dissolves freely in ammonia water, and from this solution the mineral and some other acids in excess throw down precipitates of a salt of berberine and the acid employed. We take advantage of this fact in making other salts of berberine, as before remarked, for it is usually easier and more economical to prepare this sulphate and decompose it, than to prepare the other salts direct from the percolate.

Mono-berberine sulphate crystallizes from both water and alcohol in an anhydrous form. An exposure of eight hours to a temperature of 100° C. does not result in loss of weight. A higher temperature fuses and then decomposes it, a carbonaceous mass remaining.

Action of Reagents on Mono-Berberine Sulphate.—Dilute sulphuric acid,

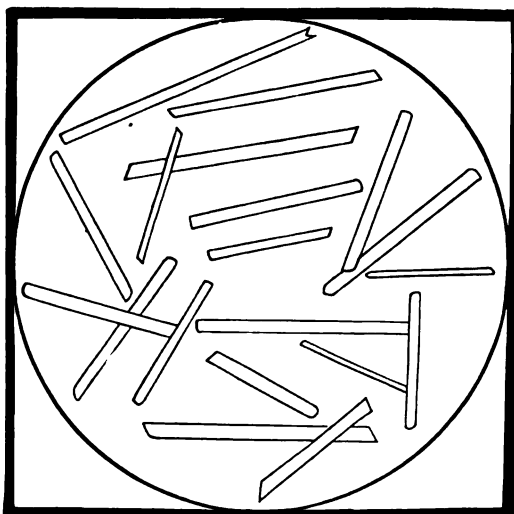


FIG. 35.

Crystals of mono-berberine sulphate (magnified 300 diameters).

when boiled with mono-sulphate of berberine, does not immediately produce a red liquid. Cold concentrated sulphuric acid dissolves it, forming at first a greenish yellow, then a brownish, and finally a dark, almost black, liquid. Hot sulphuric acid dissolves it immediately with the production of a black liquid.

Cold hydrochloric acid dissolves a small portion of mono-berberine sulphate, forming a greenish-yellow liquid, which does not change upon boiling. If hydrochloric acid, or nitric, is added to an aqueous solution of mono-berberine sulphate, a flocculent mass of crystals of hydrochlorate of berberine, or nitrate of berberine, results. These do not dissolve upon the addition of an excess of ammonia water.

Hot glacial acetic acid freely dissolves sulphate of berberine, forming an orange liquid from which, upon cooling, a mass of fine crystals separate. These are freely soluble in ammonia water, from which solution either hydrochloric acid or nitric acid produce precipitates; sulphuric acid, however, under like circumstances, forms a dark brown liquid.

Hydroxide of ammonium dissolves mono-berberine sulphate freely and immediately, sulphate of ammonium and the di-berberine sulphate resulting. If to such a solution an excess of the ordinary acids be added, combinations of these acids and berberine results, with displacement of the sulphuric acid with crystallization of the berberine salt. Advantage may be taken of this fact to prepare other salts of berberine.

Carbonate of Potassium or Sodium solutions, if dilute, freely dissolve mono-berberine sulphate. Concentrated solutions of these substances decompose it, as with hydrochlorate of berberine.

In other respects, the remarks which we have applied to hydrochlorate of berberine may be applied to this sulphate.

Solubilities.—Mono-berberine sulphate dissolves slowly in water. After agitating one part of the salt for four days with seven parts of water, it was found that 100 parts of the solution contained 1.33 parts of the salt. If a mixture of mono-berberine sulphate and water be heated, however, it rapidly dissolves, forming a supersaturated liquid, which has a dark red color, and stains glass a deep orange. It can be filtered, and sometimes permitted to remain for some days in a cool situation, without other change than the deposition of aggregations of small grainy crystals. If a little sulphuric acid be added to this supersaturated liquid (sometimes only in minute amount to a portion of it), it immediately precipitates a magma of minute crystals of mono-berberine sulphate throughout the entire liquid, and the color of the supernatant liquid changes from red to yellow.

If mono-berberine sulphate be added to a ten per cent. solution of sulphuric acid in water, until an excess of one-eighth of undissolved sulphate is present, and the mixture be heated, the sulphate will entirely dissolve, and if the solution is permitted to cool, it will form a fine magma of minute crystals. If one part of mono-berberine sulphate be quickly dissolved in twenty parts of a hot five per cent. mixture of sulphuric acid and water, and then permitted to

slowly cool, beautiful tufts of needle-like crystals result. If such a solution be digested for some hours at a temperature of 80° C, its color changes to brownish red, and upon cooling, only a small portion of the salt crystallizes. These crystals have a brown color.

Cold alcohol dissolves but a small amount of mono-berberine sulphate. After agitating one part of the salt for four days with seven parts of alcohol, the solution contained but 22 hundredths of one per cent. of the salt. Boiling alcohol, however, dissolves the salt rapidly, and in large amount, the solution being of a dark yellowish red in bulk, and orange-colored in thin layer.

Mono-berberine sulphate is insoluble in carbon disulphide, benzol, chloroform, concentrated ether, and is but slightly soluble in officinal ether.

Incompatibles.—Mono-berberine sulphate is incompatible with the mineral acids, tannic acid, gallic acid, salicylic acid, picric acid, and the soluble salts of these acids, forming precipitates when mixed with solutions of them. It is also incompatible with alkalies and the alkaline carbonates, being decomposed by these substances. Vegetable astringents usually produce precipitates with it.

DI-BERBERINE SULPHATE (NORMAL SULPHATE OF BERBERINE) ($C_{20}H_{17}NO_4$)₂ H₂SO₄.—This is the most beautiful salt of berberine. It has been used in medicine for some years, but never for a sulphate. A reference to the history of the alkaloid (p. 102) will show that its discoverer was probably Prof. Procter, although previous investigators were acquainted with the soluble compound that resulted when mono-berberine sulphate was added to diluted alkaline solutions. In our paper on phosphate of berberine, we introduce testimony which demonstrates that the substance sold in commerce under the name phosphate of berberine was in reality this compound. The so-called berberine (see p. 104) made according to the ammonia process was also the di-berberine sulphate. And we can not do better than to reproduce a portion of a paper contributed by us to the American Druggist* on the subject:

“In 1878, a paper on the salts of berberine, as produced from *Hydrastis canadensis*, was presented to the American Pharmaceutical Association.† The writer announced that, when mono-berberine sulphate is added to ammonia water, by double decomposition a dark solution of berberine results, which, by mixing with alcohol, is mostly purified from the sulphate of ammonium which precipitates. . . . It is unnecessary to go over the properties of this substance in the present paper, as my object is to call attention to the fact that the substance obtained is not berberine, *but a soluble sulphate of berberine*. The writer has been aware of this fact for some years, but out of deference to an investigator who intended to consider the subject, waited for his report. However, this gentleman having withdrawn from the field, I feel at

* American Druggist, Wm. Wood & Co., Sept., 1884, p. 166.

† This was by the writer (J. U. Lloyd).

liberty to make the foregoing statement, and in addition announce the following: . . . There are two sulphates of berberine. . . . The existence of these two sulphates was announced in *New Remedies*, 1877, p. 226, by Mr. H. B. Parsons and Mr. T. J. Wrampelmeier."

Thus it is shown that the so-called berberine of our process of 1878 was in reality a di-berberine sulphate, and the equation expressing its formation is as follows: $2C_{20}H_{17}NO_4 \cdot H_2SO_4 + 2NH_4OH = (NH_4)_2SO_4 + (C_{20}H_{17}NO_4)_2H_2SO_4 + 2H_2O$. Therefore, we introduce the process we presented at that time as follows:

*Preparation of Di-berberine Sulphate.**—Rub eight parts of mono-berberine sulphate in a wedgewood mortar, cautiously adding ammonia water until in slight excess. Pour the dark liquid into thirty-two parts of boiling alcohol, and allow the mixture to stand thirty minutes, then filter. Stir into the filtrate thirty-two parts of cold concentrated sulphuric ether, and cover tightly. Surround the vessel with ice, and allow it to stand from twelve to twenty-four hours, then separate the magma of minute crystals of di-berberine sulphate with a muslin strainer or filtering paper, and dry by exposure to the atmosphere. Purify by crystallization from boiling alcohol.

Properties.—Di-berberine sulphate is an odorless, purely bitter, lemon-yellow, crystalline powder, or orange-colored crystals (it should not be red under these conditions). It crystallizes from boiling alcohol in beautiful clumps of yellow spangles, and is the finest salt of berberine known to us. (See figure 36.) When slowly crystallized in large crystals from a concentrated aqueous solution, it is garnet red. Figure 37 (next page) represents the micro-drawing made for this publication by Mr.

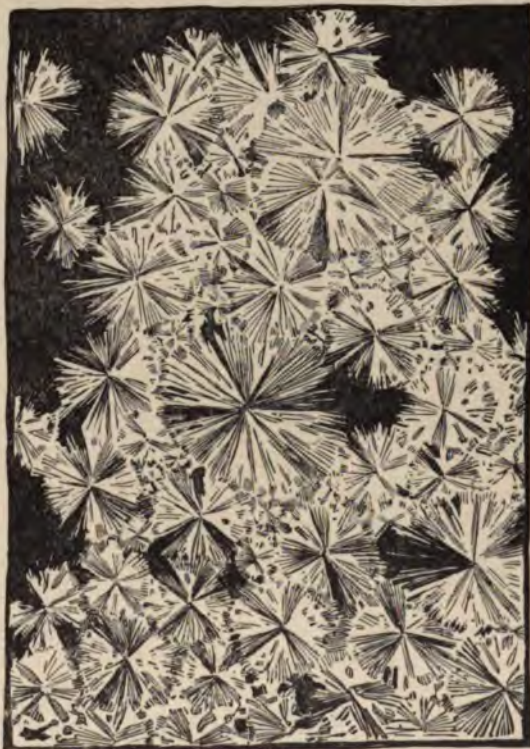


FIG. 36.

Crystals of di-berberine sulphate (natural size).

W. J. Huck, under the direction of Prof. F. B. Power, who describes them as follows: "These crystals are somewhat larger than those of the mono-berberine sulphate, and of an entirely different shape, several of the crystals

* In the original paper this is regarded as a process for making berberine.

frequently coalescing. As represented in the drawing (fig. 37), the crystals are magnified 60 diameters, and were mounted in Canada balsam."

Di-berberine sulphate is soluble in ten parts of water from an excess of one-eighth part of the salt, and under the same conditions in 293 parts of alcohol. When slowly added to anhydrous alcohol it dissolves, and finally a yellow magma separates, which, after being dried, is very much less soluble in water than the di-berberine sulphate, and almost insoluble in anhydrous alcohol. The chemistry of this change has not been studied, but it is not a decomposition of the di-berberine sulphate, with the formation of a molecule each of berberine and mono-berberine sulphate, as might be possible, for, $(C_{20}H_{17}NO_4)_2 \cdot H_2SO_4 = C_{20}H_{17}NO_4 + C_{20}H_{17}NO_4 \cdot H_2SO_4$. In one instance a specimen of several ounces of crystallized di-berberine sulphate, that had been kept in a securely sealed vial for three years, became altered in properties, and almost insoluble in water.

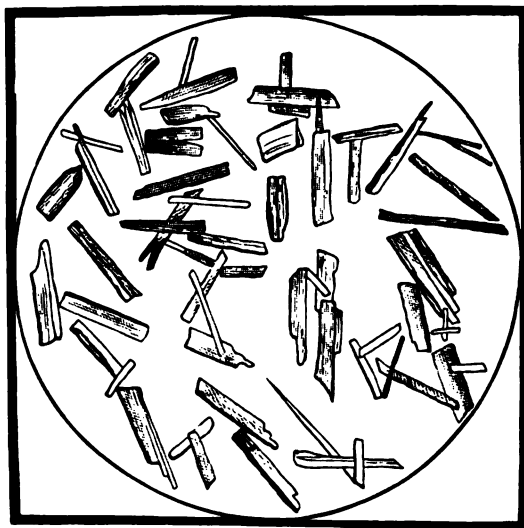


FIG. 37.

Crystals of di-berberine sulphate (magnified 60 diameters).

PHOSPHATE OF BERBERINE ($C_{20}H_{17}NO_4 \cdot 7H_4PO_4 + 4H_2O$).—A substance was introduced into commerce by Dr. T. L. A. Greve, about the year 1877, under this name, and supposed to be a phosphate of berberine. It was in order to meet the demand for a more soluble salt than either the muriate or mono-berberine sulphate, which at that time were the only salts of berberine used in American medicine. This substance was made by Dr. Greve* by digesting in boiling water a mixture of mono-sulphate of berberine, and precipitated phosphate of calcium, filtering, evaporating the filtrate to dryness, dissolving the residue in boiling alcohol to free it from sulphate of calcium, and evaporating the filtered alcoholic solution to dryness.†

In 1877, Prof. H. B. Parsons presented to the Michigan Pharmaceutical Association a process for making phosphate of berberine, and in connection with Mr. T. J. Wrampelmeier, followed it in *New Remedies*, 1878, p. 226, by an interesting paper on the subject.

They prepared a salt in accordance with the process of Dr. Greve, but found from an analysis that it was free from phosphoric acid, the "*faint trace*" present existing as an impurity in the form of bone ash. Subsequent

* *Eclectic Medical Journal*, Cincinnati, 1877, p. 311.

† Dr. Greve states that, "The above process may also be varied by substituting phosphate of lead, or phosphate of barium, for the lime salt."

analyses demonstrated that the salt was a sulphate of the composition $(C_{20}H_{17}NO_4)_2 \cdot H_2SO_4$.*

Messrs. Parsons and Wrampelmeier then made the soluble calcium ortho-phosphate. An excess of this acid calcium phosphate, $CaH_4(PO_4)_2$, was then treated with mono-sulphate of berberine, when a precipitate of calcium sulphate resulted. The mixture was then evaporated nearly to dryness, and treated with hot diluted alcohol, whereby the remainder of the calcium salts were precipitated. The hot alcoholic solution of a berberine salt was then separated, by filtration, from the insoluble calcium salts, evaporated nearly to dryness, and then mixed with cold alcohol. A canary-yellow precipitate resulted, which, upon examination, proved to be a phosphate of berberine.

Phosphate of berberine was then made by Mr. Wrampelmeier, the acid phosphate of barium, $BaH_4(PO_4)_2$, being used instead of the ortho-calcium salt. This product agreed in every respect with that obtained by the other experiment.

Analysis and Properties.—Phosphate of berberine exhibited a strong affinity for water, a long exposure, at from 67° to 70° C, being required to free it from moisture. The mean of two experiments, after the salt ceased to lose weight by an exposure of 100° C, resulted as follows:

.2803 gram lost .0181 gram=6.45 per cent.
 .3034 gram lost .0200 gram=6.59 per cent.
 Average loss at 100° C, 6.52 per cent.

After destroying the organic matter by means of sulphuric and nitric acids, the phosphoric acid was estimated according to Fresenius' method, as magnesium pyrophosphate.

.3034 gram gave .2145 gram $Mg_2P_2O_7$ =1894 of H_3PO_4 .
 .2803 gram gave .2000 gram $Mg_2P_2O_7$ =1766 of H_3PO_4 .

The average being 62.67 % of the phosphate of berberine employed.

The berberine was estimated by means of platinic chloride. According to Perrins, the precipitate has the formula $2C_{20}H_{17}NO_4 \cdot 2HCl \cdot PtCl_4$. Of which 18.22 % is platinum, and 61.899 % is berberine.

Phosphate of Berberine.	Precipitate.	Berberine.	Berberine estimated from platinum in ash.	Berberine.
.2517 gram gave	.1312 gram=	.0812.	.0815.	32.37 per cent.
.1727 gram gave	.0900 gram=	.0557.	.0526.	30.45 per cent.
.1224 gram gave	.0640 gram=	.0396.	.0390.	31.86 per cent.

The platinum in the precipitates was then estimated from the ash, and the berberine calculated, which was considered more reliable than the preceding process, as it excluded a source of error in the tared filter paper. The result is shown in the last two columns of the above table. The average of berberine from the platinum of the ash being 31.56 %.

* Dr. Greve, therefore, struck upon the soluble di-berberine sulphate, which the writer also obtained, about the same time, by another process. Neither of us assigned it to its proper position.

SUMMARY OF THE ANALYSIS.

	<i>Percentage Found.</i>	<i>Percentage Calculated.</i>
Water (H ₂ O)	6.52	6.58 per cent.
Phosphoric Acid (H ₃ PO ₄)	62.67	62.76 per cent.
Berberine (C ₂₀ H ₁₇ NO ₄)	31.56	30.65 per cent.
	<u>100.75</u>	<u>99.99 per cent.</u>

These results give C₂₀H₁₇NO₄.7H₃PO₄+4H₂O, as the formula for phosphate of berberine.* The following equation expresses the reactions: C₂₀H₁₇NO₄.H₂SO₄+6[BaH₄(PO₄)₂]=C₂₀H₁₇NO₄.7H₃PO₄+BaSO₄+5BaHPO₄.

This being the only analysis of a compound of phosphoric acid and berberine known to us, we deemed it desirable to add further information to this subject. Accordingly, we brought the matter to the attention of Prof. Virgil Coblentz, who agreed to make an ultimate analysis of the compound, and in this connection we call attention to the fact that the salt was made by him by the direct combination of phosphoric acid and crystallized berberine, instead of by double decomposition. We therefore introduce the following report: †

Preparation.—(Contributed to this publication by Prof. Virgil Coblentz). An accurately weighed quantity of the pure alkaloid, prepared by Prof. J. U. Lloyd, was dissolved in a sufficient amount of absolute alcohol, and into this solution exactly two grams of phosphoric acid (H₃PO₄) was weighed, the strength of which had been previously ascertained, two grams containing 1.2421 grams of absolute H₃PO₄. Then an equal bulk of absolute ether was added, and after allowing sufficient time for complete separation the mixture was thrown on a filter paper and the precipitate thoroughly washed with a mixture of alcohol and ether. The filter and contents were then removed and boiled in an excess of alcohol to remove all traces of adhering free acid, cooled, and mixed with its bulk of ether. The precipitate that formed was again thrown on a new filter and washed with a mixture of alcohol and ether until it was found to be free from uncombined phosphoric acid.

Gravimetric Estimation.—An amount of the alkaloid berberine weighing 0.460 grams was dissolved in absolute alcohol and treated as we have described. The liquids and washings were mixed and distilled water added; the ether and alcohol then evaporated by a gentle heat. To this aqueous solution of the free acid, ammonia water in slight excess was added and subsequently test magnesium mixture, until after having been well stirred and permitted to stand, no further precipitate followed the addition of the reagent. Ammonia water equal to one-fourth the volume of the liquid was then added, the vessel covered and allowed to stand for twelve hours. The precipitate of ammonio-

* "This formula seems, at first sight, an improbable one; but any person who will take the pains to look up the formulæ for the phosphates of the other alkaloids, will be surprised at their lack of uniformity, and at the fact that alkaloids exhibit no particular quantivalence."—PARSONS and WRAMPFELMEIER.

† Prof. F. B. Power is also estimating the composition of phosphate of berberine, using a salt made by us, and crystallized from alcohol. Unfortunately, his report is not ready, and we will, therefore, present it to our readers at a future day in the Addenda.

magnesium phosphate was then collected on a filter and washed with a solution consisting of one part of officinal ammonia water and three parts of water, until the washings no longer produced a turbidity in a solution of nitrate of silver acidulated with nitric acid. The precipitate was then dried at 100° C., and ignited in a weighed crucible to low redness. From the weight of the resulting magnesium pyrophosphate ($\text{Mg}_2\text{P}_2\text{O}_7$), the amount of phosphoric acid contained in the solution was calculated, 100 parts of $\text{Mg}_2\text{P}_2\text{O}_7$ corresponding to 88.39 parts of H_3PO_4 . 0.3297 grams of magnesium pyrophosphate were obtained from the solution, which corresponds to 0.2915 grams of phosphoric acid. Therefore, if from the 1.2421 grams of anhydrous H_3PO_4 contained in two grams of the phosphoric acid used we deduct the 0.2915 grams that remained uncombined, we have 0.9506 grams in combination with the berberine.

If one molecule of berberine $\text{C}_{20}\text{H}_{17}\text{NO}_4$ (335), combined with one molecule of H_3PO_4 (99), 0.460 grams of berberine would require 0.13595 grams of phosphoric acid. In reality nearly 0.9513 grams of acid are required theoretically to represent seven molecules of phosphoric acid, as $(.9513 \div .13595)$; this number corresponds closely to that actually found, 0.9506.

Four estimations were made in accordance with the foregoing scheme, resulting as follows:

No. 1 gave 0.9506 grams of phosphoric acid (H_3PO_4), from 0.460 grams of phosphate of berberine.

No. 2 gave 0.9509 grams of phosphoric acid (H_3PO_4), from 0.460 grams of phosphate of berberine.

No. 3 gave 0.9508 grams of phosphoric acid (H_3PO_4), from 0.460 grams of phosphate of berberine.

No. 4. gave 0.9509 grams of phosphoric acid (H_3PO_4), from 0.460 grams of phosphate of berberine.

The average, 0.9508, is practically close enough to the theoretical amount, 0.9513, to show that one molecule of berberine phosphate must contain seven molecules of phosphoric acid, therefore making the formula $\text{C}_{20}\text{H}_{17}\text{NO}_4 \cdot 7\text{H}_3\text{PO}_4$.

Volumetric Estimation.—This method depends on the indirect process of neutralization. 0.280 grams of the berberine were dissolved in absolute alcohol and phosphate of berberine was made as detailed on p. 124. The filtered mixture of alcohol and ether, containing the uncombined phosphoric acid, was then mixed with distilled water, and the ether and alcohol evaporated by a gentle heat. Into the aqueous solution that remained a normal solution of hydroxide of sodium was allowed to flow until sufficient of the latter was employed to insure the formation of the neutral sodium salt Na_3PO_4 . Solution of chloride of barium was then added to this strongly alkaline liquid until no further precipitate was produced. After some hours, the resulting $\text{Ba}_3(\text{PO}_4)_2$ was collected on a filter and well washed with water, the filtrate and washings being collected in a beaker. This was colored with solution of

litmus and a normal solution of sulphuric acid was allowed to flow into it from a burette until a permanent pink hue resulted. The number of C. c. of normal acid solution required, deducted from the number of C. c. of the alkaline solution, was accepted as giving the amount of the latter required for the exact neutralization of the phosphoric acid; one C. c. of the normal alkali corresponding to 0.327 grams of anhydrous phosphoric acid.

SUMMARY OF THIS EXPERIMENT.

1.2421 grams of H_3PO_4 were contained in the 2 grams of acid used.
0.6638 " " " remained uncombined.

0.5783 " " " combined with the 0.280 grams berberine.

42.3 C. c. of normal solution NaOH used to neutralize the free acid.
22.0 " " " H_2SO_4 " " excess of NaOH.

20.3 C. c. amount required for exact neutralization of uncombined H_3PO_4 .
Hence, 20.3 C. c. $\times 0.0327 = 0.6638$ grams of H_3PO_4 uncombined.

Four more experiments were made with the following result:

Experiment.

No. 1.	0.280	grams	berberine	$\text{C}_{20}\text{H}_{17}\text{NO}_4$	yielded of	H_3PO_4	0.5790	grams.
No. 2.	0.280	"	"	"	"	"	0.5788	"
No. 3.	0.280	"	"	"	"	"	0.5787	"
No. 4.	0.280	"	"	"	"	"	0.5788	"

If one molecule $\text{C}_{20}\text{H}_{17}\text{NO}_4$ (335) combines with one molecule of H_3PO_4 (99), then 0.280 gram alkaloid would require 0.827, but we find practically that 0.280 gram of the alkaloid combines with on an average 0.5788 gram of the acid. Then, as $0.5788 \div 0.0827$ equals about seven, hence if theoretically 0.5792 gram of the acid combine with .280 gram of the alkaloid, and practically the amount found is about 0.5788 of acid, the formula must then be $\text{C}_{20}\text{H}_{17}\text{NO}_4 \cdot 7\text{H}_3\text{PO}_4$.

Properties.—Phosphate of berberine is a canary yellow powder, odorless and bitter. It changes to olive green when heated above 70°C ., and gives up its water of crystallization at 100°C . It absorbs water upon exposure, and changes to a darker yellow, but does not deliquesce. Crystallized from hot alcohol, it forms irregular prismatic crystals. (P. and W.)

The crystalline structure of phosphate of berberine is represented by the micro-drawings (Fig. 38) made for our publication by Mr. W. J. Huck, under the direction of Prof. F. B. Power, who writes of them as follows: "The crystals are much broader than those of the preceding salts in consequence of the coalescence of several crystals, and the ends are very irregular in outline."

Solubilities.—One part of the crystallized salt dissolved in 10.43 parts of cold water.

One part of the salt dried at a temperature of 100°C . dissolved in 21.52

parts of cold water. It is almost insoluble in cold alcohol, and insoluble in pure alcohol, ether, and chloroform.

There is really no preference to be made for the pure phosphate over the di-berberine sulphate, which was really introduced for a phosphate. This fact has necessitated a longer paper than would be demanded by the phosphate in such a work as ours.

NITRATE OF BERBERINE.
 $C_{20}H_{17}NO_4 \cdot HNO_3 + H_2O$ (Perrins).
 —Nitrate of berberine is sometimes used in medicine, but not as extensively as the muriate.

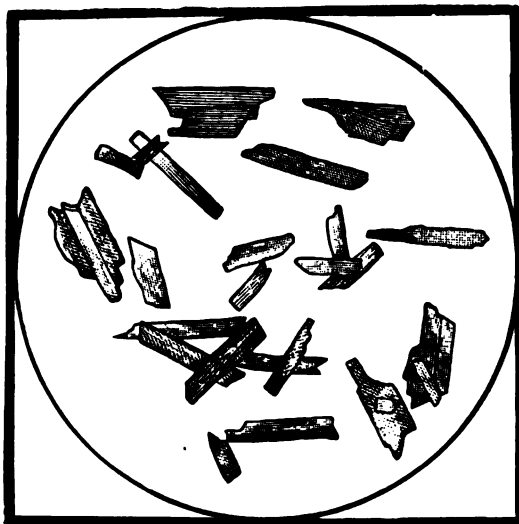


FIG. 33.

Crystals of phosphate of berberine (magnified 300 diameters).

Preparation.—Nitrate of berberine is to be made according to the process employed in making the hydrochlorate, except that nitric acid is used instead of hydrochloric. This process can be followed even to the washing of the salt, for it is but slightly soluble in cold water. It should be dried, however, by exposure to a cool atmosphere, because decomposition follows when it is heated, especially if slightly moist.

Properties.—Nitrate of berberine obtained in this manner is in the form of a lemon yellow crystalline powder, odorless when fresh. It slowly dissolves in the mouth, imparting a bitterness to the taste. When kept for any length of time, especially during warm weather, or when heated in a test tube, it decomposes, evolving NO, and changes to a reddish color. The ultimate effect of this decomposition upon the constitution and properties of the residue has never been determined. According to Perrins it is perfectly stable at $100^{\circ} C.$, but we have known it to decompose and evolve NO when kept in bulk at the ordinary temperature and become unfit for use. We do not consider it a desirable compound.

When nitrate of berberine is added to cold nitric acid, a dark brownish-red solution results, which, upon warming, changes to orange-red, with the evolution of an abundance of nitric oxide (NO). If one part of nitrate of berberine is gradually added to eight parts of hot nitric acid, nitric oxide is rapidly evolved, and finally the liquid changes from brown to a ruby red color. This solution has the characteristics which we have described (p. 113), under "Nitric Acid, Action on Hydrochlorate of Berberine," dissolving in the same solvents and contra, forming a yellow precipitate with water, and otherwise reacting so as to indicate that the products of decomposition in both cases are perhaps identical. Less heat, however, is required to produce the re-

action between nitrate of berberine and nitric acid than between hydrochlorate of berberine and nitric acid.

Nitrate of berberine dissolves in cold sulphuric acid, forming a dark brown or black liquid, which does not change upon heating. Dilute sulphuric acid (1 to 7) forms a red liquid if boiled with nitrate of berberine. This color is not affected by an excess of hydrochloric acid, but is changed to brown by an excess of ammonia water. Nitrate of berberine dissolves slightly in cold hydrochloric acid. If a mixture of nitrate of berberine and hydrochloric acid be boiled, the salt is decomposed, a dark brown liquid resulting.

Hot glacial acetic acid freely dissolves nitrate of berberine with the production of a dark orange-colored liquid, which, upon cooling, deposits an abundance of yellow crystals. These dissolve freely in ammonia water, and from this solution hydrochloric acid precipitates masses of hydrochlorate of berberine. Under the same circumstances either sulphuric or nitric acid, with the aforementioned ammoniacal solution, forms a deep red liquid.

Nitrate of berberine will dissolve to an extent in cold ammonia water and more freely upon boiling, and crystallizes from the latter solution upon cooling. It corresponds with hydrochlorate of berberine in its deportment towards dilute or concentrated solutions of the hydroxides of potassium or sodium.

Nitrate of berberine is insoluble in benzol, carbon disulphide and concentrated sulphuric ether. It is slightly soluble in alcohol, and more so in water.

The saturated solution of nitrate of berberine in cold water has a greenish yellow color. From this solution most of the berberine in the form of crystalline salts is deposited by nitric, sulphuric or hydrochloric acid, but not by the addition of acetic or phosphoric (H_3PO_4), acid. No precipitate follows when magnesium sulphate, ammonium oxalate, lead acetate or copper sulphate are added to the aqueous solution, but a precipitate follows with potassium ferrocyanide (greenish), potassium chromate and potassium bichromate (yellow), and potassium iodide (yellow and gelatinous). Picric acid, picrate of ammonium, and solutions of the soluble picrates precipitate berberine completely from the solution of nitrate of berberine, the result being picrate of berberine.

CITRATE OF BERBERINE—*Preparation.*—This may be made by direct combination between solution of citric acid and berberine. When a solution of one part of di-berberine sulphate is dissolved in sixteen parts of water and two parts of citric acid are added, and the solution permitted to stand for some days in a cool location, beautiful tufts of crystals are formed. These are of a fibrous, silky texture, very bitter, permanent, and are free from sulphuric acid. (Figure 39), next page. They have never been analyzed. Citrate of berberine is not very soluble in cold alcohol or water, but more freely in boiling.

A cold aqueous solution of citrate of berberine has a greenish yellow color. Either sulphuric, hydrochloric, or nitric acid produces precipi-

tates when added to this liquid. Citrate of berberine is not precipitated from aqueous solution by solution of magnesium sulphate, ammonium oxalate or copper sulphate. Precipitates result, however, from the addition of potassium iodide (gelatinous), potassium ferrocyanide, potassium chromate, potassium bi-chromate and by acetate of lead. This last (acetate of lead), differs from the reaction with nitrate of berberine. Picric acid or picrate of ammonium precipitates the berberine completely.



FIG. 39.
Crystals of citrate of berberine,
(natural size).

Citrate of berberine corresponds with nitrate of berberine and sulphate of berberine in its deportment towards concentrated sulphuric acid. If boiled with an excess of dilute sulphuric acid (1 to 7), the solution acquires a slight brownish tint and does not change by the addition of either hydrochloric acid or ammonia water.

Hydrochloric acid dissolves citrate of berberine to a slight extent, forming a yellow liquid, which is not changed by boiling.

Citrate of berberine corresponds with nitrate of berberine in its deportment towards glacial acetic acid and nitric acid.

Solubilities.—Citrate of berberine is insoluble in benzol, carbon disulphide, concentrated ether, and chloroform. It is slightly soluble in officinal ether.

Ammonia water is a good solvent for citrate of berberine, a reddish-brown liquid resulting.

PICRATE OF BERBERINE.—This substance is formed when picric acid, or a soluble picrate, is added to the solution of any other salt of berberine. This compound is not used in medicine outside of the Homœopathic school, but it is of considerable interest to us as a test for berberine. We shall refer more fully to the characteristics of picrate of berberine hereafter.

Boiling distilled water dissolves very small portions of picrate of berberine, and upon cooling the solution, the salt separates entirely in crystalline form.

Picrate of berberine is insoluble in cold water, alcohol, ether, chloroform, benzol or carbon disulphide.

Nitric acid reacts with picrate of berberine in a manner similar to the action of that acid and hydrochlorate of berberine. The liquid which results from the action of hot nitric acid on picrate of berberine differs from that produced by hydrochlorate of berberine, as follows: With sulphuric acid it forms a red solution, which becomes lighter colored and cloudy on standing. It mixes with water in all proportions, forming clear solutions.

Sulphuric acid, hydrochloric acid and glacial acetic acid react with picrate of berberine similar to the manner in which they do with hydrochlorate of berberine.

Hydroxides of ammonium, sodium or potassium react as follows: Cold

dilute solutions scarcely affect it, and boiling dilute solutions dissolve it very sparingly. Concentrated solutions of these alkalies dissolve it more freely, and if these solutions are rendered acid with sulphuric acid, a cloudiness results, which is dissipated by the addition of ammonia water.

Picric acid and the soluble picrates completely separate berberine and berberine salts from aqueous solution.

DETECTION AND ESTIMATION OF BERBERINE.—In the first natural order of plants, we have yet to consider two that contain berberine. These are *Coptis trifolia* and *Xanthorrhiza apiifolia*, and we shall introduce the processes for estimating the alkaloid when we reach the latter plant.

HYDRASTINE (THE WHITE ALKALOID OF HYDRASTIS CANADENSIS). $C_{22}H_{23}NO_6$ —*History of Hydrastine.*—In April, 1851, Mr. Alfred B. Durand published an essay in the American Journal of Pharmacy on *Hydrastis canadensis*. He had obtained, among other substances, a crystallizable body, and was inclined to view it as an alkaloid. With the light now before us, we know that his supposition was true, but in view of the fact that he could not make a crystallizable salt, he left the matter open, as follows: "For the present I shall therefore call the substance *Hydrastine*, with the hope that I will be more successful, after repeating my experiments on a large scale, in fully establishing its rank among the alkaloids." Since the alkaloid has not, as yet, yielded crystallizable salts with the acids Mr. Durand combined with it, viz. : nitric, hydrochloric, acetic and oxalic, it is not strange that he failed to obtain crystals. It seems that he neglected to continue his work ; at least, he published nothing further on the subject. Hence, while the honor of the discovery belongs to Mr. Durand, the investigation of the character of the alkaloid and its salts must be placed to the credit of subsequent investigators ; and in view of the opinions held by some persons, who believe that other parties discovered the alkaloid, we introduce a condensation of Mr. Durand's original process :

The crushed root of *Hydrastis canadensis* was macerated with cold water and then percolated with that menstruum, the percolate afterward being evaporated to dryness. 500 grains of the residue was dissolved in eight ounces of water, 125 grains of oxide of magnesium added, and the mixture digested on a sand bath for two hours, and then filtered. The residue within the filter paper was dried, digested in boiling alcohol, filtered, and the filtrate allowed to evaporate spontaneously. The result was, to use Mr. Durand's words, "beautiful, brilliant, yellow, four-sided, prismatic crystals, terminated by pyramidal summits."

In reviewing the process of Mr. Durand, it will be seen that, when the aqueous liquid obtained from the root was digested with magnesia, the acid then in natural combination with the white alkaloid united with the magnesia. This reaction was followed by precipitation of that alkaloid, which is insoluble in water, thus producing the "residue." This residue, upon being dried, was exhausted with boiling alcohol, in which menstruum, the alkaloid, is very soluble, and from it hydrastine was obtained in colored crystals by spontaneous

evaporation of the alcohol. In describing these crystals, Mr. Durand identified the white alkaloid of hydrastis so clearly as to leave no doubt in the mind of any person familiar with the alkaloids of hydrastis. He states "it is insoluble in water, sparingly so in cold ether and alcohol, more so in ether when hot, entirely dissolved by chloroform and boiling alcohol."

The white alkaloid, hydrastine, is the only product of hydrastis that will conform to the foregoing description.

The color of Mr. Durand's alkaloid, a "brilliant yellow," was due to the presence of berberine, for that substance is most tenaciously held by hydrastine, and many re-crystallizations are necessary before it can be obtained colorless. (See preparation of hydrastine, p. 132, and Hale's "third alkaloid," p. 140).

Nothing was then written on the subject of hydrastine for a period of eleven years, although Prof. E. S. Wayne, of Cincinnati, made and presented to Prof. Procter (1856) a sample that, to use the words of Prof. Procter in the American Journal of Pharmacy, July, 1862, was "Identical in appearance and character with Durand's, except that it was lighter in color."

The next paper appeared in the American Journal of Pharmacy, July, 1862. The author, Mr. Wm. S. Merrell, speaks of having recently discovered two alkaloids in the rhizome of *Hydrastis canadensis*, and he proposed for them the names hydrastia and hydrastina. Both of these alkaloids had been discovered previously, one (hydrastia) being the well-known berberine. His description of that for which he proposed the name hydrastina, identified it as the alkaloid discovered in 1850,* by Durand, and prepared in 1856 by Wayne. Mr. Merrell's proposed name could not, therefore, be accepted, and as the sample Mr. Merrell submitted to the editor of the Journal of Pharmacy was darker in color than either that made by Mr. Durand or Prof. Wayne, nothing was added to the literature on this subject.

The alkaloid had not yet been purified, all the parties reporting that it was either yellow (Durand and Wayne) or greenish (Merrell). The production of the pure alkaloid was reserved for Mr. J. Dyson Perrins, who announced it in the London Pharmaceutical Journal, May, 1862. He purified it by repeated crystallizations from hot alcohol, and described it as crystallizing in "four-sided prisms, and of great brilliancy," and he said of it, "the crystals are white."

Mr. F. Mahla, of Chicago, next contributed to the American Journal of Science and Arts, July, 1863, a paper on this alkaloid, and in 1878, the writer (J. U. Lloyd), read a paper before the American Pharmaceutical Association, on its preparation.

This brings us to the present year, and to the most important paper that has been written on the subject. It was by Prof. Frederick B. Power, of the University of Wisconsin, and was contributed to the American Pharmaceutical

* Mr. Durand's paper was written in the summer of 1850, and published in 1851.

Association, 1884, and we shall make many references to this admirable treatise.

Preparation.—Hydrastine has always been made by decomposing the natural salt by means of an alkali. We introduce the process contributed by us to Prof. Power, by which we prepared the alkaloid examined by that gentleman, it is as follows:

“One thousand pounds of powdered *Hydrastis canadensis* were properly moistened with alcohol, packed in a suitable percolator, and percolation then conducted with the use of officinal alcohol as a menstruum. Sulphuric acid, in strong excess, was added to the percolate, and, after four hours, the supernatant liquid was filtered from the mass of crystals of sulphate of berberine ($C_{20}H_{17}NO_4 \cdot H_2SO_4$). To this filtrate ammonia water was added until it showed but a slightly acid reaction, then strained to separate the precipitated sulphate of ammonium, distilled to a syrupy consistence, and the residue poured into ten times its bulk of cold water. After twenty-four hours the precipitated resinous substances, oils, etc., were separated from the liquid by filtration, the filtrate being an impure solution of sulphate of hydrastine. Ammonia water, in decided excess, was then added to this resultant liquid, and the precipitate of impure hydrastine collected and dried. It was then digested with one hundred times its weight of cold water, to which sulphuric acid was carefully added to *slight* acid reaction, and, after twenty-four hours, filtered. The filtrate was again precipitated with excess of ammonia water, the precipitate collected on a strainer and dried. This precipitate was powdered and extracted with boiling alcohol, from which impure, dark yellow crystals of hydrastine separated when the alcoholic solution was cooled. The crystals were purified by repeated crystallizations from boiling alcohol. In order to obtain the hydrastine perfectly colorless, when in the form of large crystals, many crystallizations are necessary.”

Where the operator labors under the disadvantages of imperfect apparatus, thus entailing a great loss of alcohol, water can be used as a menstruum. However, under these circumstances, impurities are introduced that are not present when alcohol is used. The mother liquor from berberine sulphate

(see page 117) can be used and adapted to this process.

Crystalline Form and Appearances.—Hydrastine always forms imperfect crystals. Even when slowly crystallized, in large quantity, they are irregularly developed, and as they almost invariably form in such a way as to present their lateral surfaces to the solution, it is difficult to obtain good specimens. Figure 40 illus-

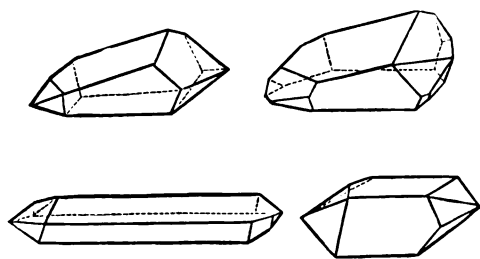


FIG. 40.
Crystals of Hydrastine (natural size).

trates a few crystals that were selected from a batch of eight pounds of the alkaloid, and present the most perfect of the specimens, and as they appeared in the solution. They are such as Prof. Power employed in making his measurements. The following description is that of Prof. Power, and figures 41 and 42 represent the perfected crystals as constructed by that gentleman.

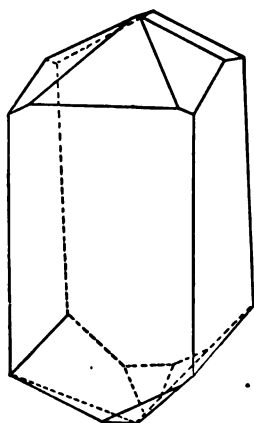


FIG. 41.

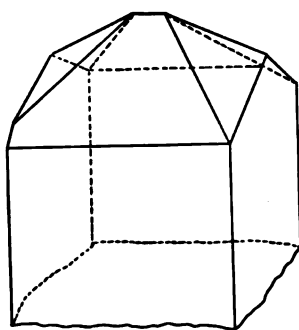


FIG. 42.

Crystals of Hydrastine (enlarged and perfected by Prof. F. B. Power).

making an orthographic projection, and the angles may be said to be as geometrically accurate as is possible to obtain them without absolute measurements. In Fig. 42 the terminal faces are shown to be very perfectly developed, while Fig. 41 represents a crystal as viewed somewhat from the side and from above, the terminal faces not so symmetrically developed, and therefore having a somewhat more complicated form. It is interesting to observe that when both ends of the crystals are developed, as shown in Fig. 41, the corresponding terminal faces of opposite ends are invariably inclined to each other at an angle of exactly 90° ."

Hydrastine can be crystallized in glassy crystals, perfectly colorless and very brilliant. As a rule, however, the crystals are opaque and white, owing to the presence of numerous fractures. When in this form and in small crystals, it may be quite colored and appear white.

Chemistry of Hydrastine.—The first analysis was made by Mr. F. Mahla,* who assigned to it the composition $C_{22}H_{24}NO_6$. From his figures Kraut deduced the formula $C_{22}H_{23}NO_6$ †. Thus it is that the investigation of Prof. Power, in 1884, is the second published contribution to the subject, although Prof. J. F. Eykman, of Tokio, Japan, has investigated the subject, but has not, as yet, published the results of his analysis.‡ Prof. Power's analysis coincided very nearly with that of Mr. Mahla, although he followed a different method for making his determination. The following table compares the results of the analyses:

* Silliman's American Journal, Vol. 36, No. CVI., p. 57.

† See Power's paper on Hydrastine, Proceedings of the American Pharmaceutical Association, 1884.

‡ We are informed by Prof. Eykman that he is especially interested in the decomposition products of this alkaloid, and we hope some day to present his paper.

Calculated for $C_{22}H_{23}NO_8$	Prof. Power found.	Mr. Mahla found.	
C=66.48 per cent.	66.69 per cent.	66.69	66.38
H= 5.79 per cent.	5.61 per cent.	6.01	5.69
N= 3.53 per cent.	3.46 per cent.	3.83	3.76
O=24.20 per cent.			
100.			

Prof. Power states that "The results of both our analyses are seen to agree quite closely with the accepted formula, which may, therefore, now be presumed to be correct.

Properties of Hydrastine.—Hydrastine unites with the acids, and forms salts, none of which have as yet been crystallized. Prof. Power failed to produce a crystal, and we have exposed large amounts of the muriate, sulphate and citrate, to the most favorable conditions, and to a temperature of -28° C. in lots of ten pounds, without success. By spontaneous evaporation a glassy substance invariably remains, destitute of crystalline form.

When a salt of hydrastine is dissolved in water and then precipitated by an alkali, the result is a bulky amorphous magma of the alkaloid. This begins to shrink in bulk in a short time, and finally assumes a crystalline form, when the product will occupy but a small proportion of the bulk of the original magma. The addition of alcohol to such a precipitate hastens the change from the amorphous to the crystalline. Impure hydrastine precipitates white, owing to the minute division, but becomes very dark after assuming the crystalline form, carrying the coloring matters with it. For this reason it is not practical to purify the alkaloid by repeated solutions in acid water and precipitations with an alkali. Although mono-berberine sulphate is quite soluble in dilute ammonia water (forming the di-berberine sulphate), and hydrastine is perfectly insoluble in that menstruum, it is impossible to separate the berberine from sulphate of hydrastine by the method of precipitation. The tenacity with which the hydrastine holds this yellow alkaloid under these conditions led the writer to doubt for a long time the identity of this yellow substance and berberine (and others have been misled); but by repeated crystallizations of impure (yellow) hydrastine from boiling alcohol, a deep yellow liquid was obtained that, upon purification, yielded a considerable amount of berberine. One experiment, wherein a batch of six and one-half pounds of impure hydrastine was worked, yielded three and one-half ounces of mono-sulphate of berberine. (See Hale's "Third Alkaloid," p. 142.)

Hydrastine is tasteless if the saliva is of alkaline reaction. Its soluble salts are acrid.

Action of Reagents on Hydrastine.—According to Prof. Power, "The crystals of hydrastine are affected in the following manner by reagents:

"Concentrated sulphuric acid produces a yellow color, which, in contact with a crystal of potassium bichromate, becomes brown. Concentrated sulphuric acid, on warming, produces a bright red color. Concentrated nitric acid produces, in the cold, a yellow color, changing to reddish-yellow. Con-

centrated hydrochloric acid gives no coloration, either in the cold or upon warming. Concentrated sulphuric acid and monolybdate of ammonium gives an olive-green color, which appears to be its most characteristic test."

The solution of the hydrochlorate is affected as follows by reagents (Power):

"Ammonia water and the fixed alkalies give a white, curdy precipitate, sparingly soluble in excess; potassium iodide, potassio-mercurio iodide, potassium ferrocyanide, potassium sulphocyanide, mercuric chloride and tannic acid produce white precipitates; iodine and potassium iodide, a light brown precipitate; potassium bichromate, a yellow precipitate; picric acid, a bright yellow precipitate; platanic chloride, an orange yellow precipitate; auric chloride, a deep yellowish-red precipitate."

Decomposition Products of Hydrastine.—Crystals of hydrastine fuse "at 132° C. (Mahla states 135° C.), to a light amber-colored liquid. When heated on platinum-foil they decompose with the evolution of empyreumatic, inflammable vapors, reminding, as Mahla had previously observed, somewhat of carbolic acid, and leaving a large amount of ash, which burns slowly away at a red heat. In order to ascertain whether hydrastine is capable of yielding a hydro compound, five grams of the alkaloid were dissolved in dilute sulphuric acid, and subjected for about two days to the action of nascent hydrogen, as developed from metallic zinc and platinum. The liquid was then filtered, precipitated by ammonia water, in slight excess, and the precipitate, after washing, dissolved in hot alcohol, and allowed to crystallize. The crystals are insoluble in water, and closely resemble in appearance those of hydrastine, but possess a slightly yellowish tint, which could not be removed by repeated crystallization. The melting point also lies close to that of hydrastine, being observed at 131° C. I have not as yet subjected these crystals to ultimate analysis, but have formed therefrom and analyzed the hydrochlorate. The latter, like the hydrochlorate of hydrastine, is amorphous, and remains, by the evaporation of its solution, in the form of a transparent, yellowish varnish, yielding, however, a nearly white powder, freely soluble in water. After drying at 100° C., 0.7830 gram of substance gave 0.2560 gram AgCl = 0.0651 gram HCl , or 8.31 %.

"This result would therefore indicate that a *hydro-hydrastine* is thereby formed, by the absorption of four atoms of hydrogen, and is analogous in composition to hydroberberine, $\text{C}_{20}\text{H}_{21}\text{NO}_4$ (Ann. Chem. Pharm. Suppl., 2, 191).

Calculated for $\text{C}_{22}\text{H}_{17}\text{NO}_6 \text{HCl}$.	Found.
HCl = 8.34 per cent.	8.31 per cent."
	—Power.

Prof. Power also formed combinations of hydrastine and both bromine or iodine, such reactions being accompanied by the evolution of considerable

heat, but he did not determine the composition of such compounds. By distilling a mixture of the alkaloid and caustic potash, unpleasant, inflammable vapors escaped, and a yellowish brown mass remained. Upon dissolving this in water and adding sulphuric acid until in slight excess, and distilling the liquid, formic acid was detected in the distillate. The residual acid liquid upon agitation with ether, and evaporation of the ethereal solution, yielded protocathechuic acid ($C_7H_6O_4$); and no other acids were identified. (This acid is also obtained as a decomposition product of berberine; see p. 109).

Upon treating hydrastine in alcoholic solution with ethyl iodide and subjecting it to heat, hydriodic acid was evolved, and the reddish yellow syrup that remained upon dilution with alcohol deposited a white crystalline powder. This dissolved freely in warm water, and crystallized colorless upon cooling. These were anhydrous, fused at about $183^\circ C.$, but underwent decomposition by the application of heat. An analysis of this substance demonstrated that it had the composition $C_{22}H_{22}$ (C_2H_5), NO_6HI , and was evidently the *hydriodate of ethyl-hydrastine*. Since this compound was formed by the substitution of the ethyl radical (C_2H_5), for one atom of hydrogen of the molecule of hydrastine, Prof. Power considers hydrastine to be a secondary or imide base, and he writes as follows:

“In this respect, according to Henry* and Bernheimer,† it occupies an analogous position to berberine, since they obtained from the latter mono-ethyl and methyl derivatives, while, according to Perrins and Schmidt, in the case of berberine, the simple hydriodate of the base is thereby formed.

“That the crystalline compound obtained from hydrastine is really an ethyl derivate is evident, not only from the analysis, but I have also prepared the simple hydriodate by dissolving the alkaloid in freshly prepared hydriodic acid. As thus obtained, it is an amorphous substance, and very easily decomposed.”

Solubility of Hydrastine.—Hydrastine is perfectly insoluble in water, or dilute alkaline solutions. Chloroform dissolves it freely, and is the best solvent we have found. It also dissolves in benzol, ether and cold alcohol, and freely in boiling alcohol. According to Prof. Power, it is insoluble in petroleum benzine, and its relative solubilities in the following liquids are as follows: One part of hydrastine in 1.75 parts of chloroform, in 15.70 parts of benzol, and in 120.27 parts of cold alcohol. Hydrastine unites with acids to form salts which are mostly soluble, tannic acid and picric acid forming insoluble combinations. These artificial salts are of acid reaction.

Salts of Hydrastine.—Muriate of hydrastine is used in medicine more extensively than any other salt, but the citrate is in some demand. These are both very soluble, and are colorless, although if a prolonged temperature be applied to the muriate, even if not above $82^\circ C$, it turns yellow.

* Ann. Chem. Pharm. 115, p. 132.

† Gazz. Chim. Ital. xiii., pp. 329-342.

Alkalies decompose solutions of the salts of hydrastine, the alkaloid being precipitated.

These salts are best prepared by dissolving the acid in alcohol, and then adding an excess of hydrastine. After the solution ceases to take up the alkaloid, it is filtered and brought, if necessary, to a *very slight* acid reaction by means of the acid employed, and then evaporated at a low temperature to dryness. Salts of hydrastine and some of the volatile acids are not permanent, but decompose upon drying them, the acid escaping. Prof. Power calls attention to this fact with acetic acid. The composition of the salts of hydrastine are as follows: Muriate of hydrastine $C_{22}H_{23}NO_6 \cdot HCl$ (Mahla & Power). Double chloride of hydrastine and platinum $(C_{22}H_{23}NO_6 \cdot HCl)_2 + PtCl$ (Mahla & Power). Sulphate of hydrastine $(C_{22}H_{23}NO_6)_2 \cdot H_2SO_4$ (Power). Double chloride of hydrastine and gold $(C_{22}H_{23}NO_6 \cdot HCl)_2 AuCl_3$ (Power).

YIELD OF HYDRASTINE AND BERBERINE FROM HYDRASTIS CANADENSIS.—The proportion in which these substances exist in hydrastis is quite variable. The season of year in which the rhizome is gathered, the method of curing the drug, and its age, being instrumental in varying the amounts of the alkaloids. If the drug is gathered in July or August, and quickly dried in the shade, it is in the best and most valuable condition. If it is gathered in the spring of the year, it is of inferior quality. Under any circumstance, carelessness in curing of the drug injures it, and may render it completely worthless. We have a constant experience in this variability of quality, and every year are compelled to reject considerable amounts that will not, in yield of alkaloids, repay the expense of working the material (see p. 95). That such a drug is not lost to the world may be inferred by consulting the table that we offer under powdered hydrastis, and it is to be hoped that in a day to come hydrastis (and other American drugs) may command a price in accordance with its real value.

The amount of berberine that exists in hydrastis is also influenced by the length of time the rhizome has been exposed to the atmosphere. It is constantly decomposing, even though the drug is stored in a comparatively protected position (see pp. 84 and 85). There seems to be a kind of decay that finally will result in the destruction of a considerable amount of berberine. In order to determine the progress with which this decay continues, we selected, 1870, pounds of freshly gathered, dried, hydrastis. Of this lot 500 pounds were worked at once, in a single percolator; 700 pounds in like manner were worked in twelve months, and 670 pounds in twenty-four months. Every precaution was taken to insure the same manipulation with each batch. The result was as follows:

The first batch, 500 pounds,	yielded 9	pounds of mono-berberine sulphate, or 1.8	per cent.
" second " 700	"	" 9¾	" " " " 1.39
" third " 670	"	" 9	" " " " 1.34
Average of 1870	"	being 27¾	" " " " 1.48

(The average yield of commercial hydrastis is from 18 to 28 ounces of sulphate of berberine to the hundred pounds. It is not profitable to carry the extraction to the utmost limit, and from 18 to 24 ounces is a fair product.)

Hence it follows that it is not economy to store hydrastis from year to year, and manufacturers of these alkaloids have learned to work the drug while recent. Regarding the white alkaloid, hydrastine, we can not present a similar line of comparison. It is our custom to reserve several batches in crude form, and work the product of about 5,000 pounds of hydrastis at once. The yield of purified hydrastine, perfectly white crystals, averages from one-fourth of one per cent. to three fourths of one per cent. of the drug employed.

In this connection we will remark, that we have often noticed that batches of the drug which gave unusually low amounts of berberine, were liable to yield an increased amount of hydrastine. Mr. J. W. Forbes informs us that he has also noted this peculiarity, in working the drug in large amounts. In one instance (recorded by us in 1879) a lot of 1,000 pounds of ground hydrastis was moistened with water, and, by an accident, only half of it could be worked at once. The remainder became heated and changed in appearance (becoming greener in color), and when it was worked, the berberine proved to have mostly perished. The result, however, was a yield of hydrastine very much in excess of that obtained from the other half of the drug.

These circumstances, taken together, would suggest that there was a natural connection between the alkaloids, the indication being that, if such is the case, hydrastine is produced in the economy of the plant, by the disintegration of berberine. Prof. F. B. Power, in reviewing the analyses of these alkaloids, is inclined to view this relationship as complex, if it exists at all, and he writes: "It is also quite evident that there is no simple relationship between hydrastine and the alkaloid berberine, $C_{20}H_{17}NO_4$, such as exists, between the associate alkaloids, morphine and codeine, or caffeine and theobromine." It must be admitted that, if such changes occur, they are perfectly obscure and beyond the light of our present knowledge of the chemistry of these substances. It must also be recognized that there are several constituents in hydrastis that, together with their decomposition products, are unknown. In this connection we are sometimes led to compare together the plants that yield berberine, and it is usual to find the alkaloid associated with more or less of another alkaloid. It is not unreasonable to infer that a connection exists between them.

HALE'S "THIRD ALKALOID OF HYDRASTIS."—*History*.—This substance is recorded under the name "Hale's Third Alkaloid." While it is true that Mr. A. K. Hale* obtained a body from hydrastis that seemingly possessed properties that would distinguish it from both berberine and hydrastine, he did not really announce that it was a new alkaloid, as some persons seem to suppose. The heading of his paper, "Is there a Third Alkaloid in *Hydrastis Canadensis*," indicates that the author was undecided, and took this method to bring his experiments before the public, in order that subsequent investigators might determine the matter.

* American Journal of Pharmacy, 1873, p. 217

The material obtained by Mr. Hale was afterward identified by Mr. John C. Burt,* who gave a number of additional reactions. He also presented a micro-drawing of the sulphate, which we reproduce herewith (Fig. 43). Finally it was obtained by Mr. Herman Lerchen,† who affixed to it the name xanthopuccine.

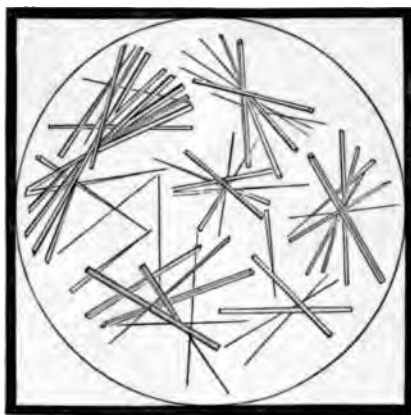


FIG. 43.

Crystals of the Sulphate of Hale's "Third Alkaloid" (magnified).‡

It would seem that these determinations should establish the fact that such an alkaloid existed, but we can not pass the matter without presenting evidence that we feel is worthy of consideration, and which leads us to view the impure substance obtained by these gentlemen as a mixture of berberine, hydrastine, and impurities of hydrastis. We will first review Mr. Hale's process, as follows: "I treated the powdered root of *Hydrastis canadensis* in a percolator with distilled water until the strength seemed to be exhausted; then I proceeded to remove the berberine as a hydrochlorate by the addition of hydrochloric acid. Removing this precipitate of hydrochlorate of berberine by filtration, I then proceeded to obtain the hydrastine by adding water of ammonia (10 per cent.) until a precipitate ceased to be thrown down. This precipitate I separated by filtration, and dissolved in and crystallized from alcohol, when, instead of hydrastine, as the books described it, I found that the characteristic prisms of hydrastine were colored by and intimately mixed with a yellow powder, which I supposed to be berberine that had not been thrown down as a hydrochlorate. Being thus a little disconcerted at not obtaining the result I hoped for, I made another percolate of the drug, and to the mother liquor of berberine I carefully added water of ammonia (10 per cent.) to the neutral point. The precipitate thus obtained I dissolved in and crystallized from alcohol, which furnished beautiful and well-defined prismatic crystals of hydrastine, free from yellow coloring matter at all resembling berberine.

"To the neutral mother liquor of hydrastine, I now added water of ammonia (10 per cent.) to a strong alkaline reaction. This gave me a yellow precipitate, which I separated, and found to correspond with the yellow powder above mentioned as accompanying the first attempt to obtain hydrastine, and to be darker in color than berberine."

Mr. Hale thought that this yellow substance might be a new alkaloid, and it has since been referred to as "Hale's Third Alkaloid."

Remarks.—An important point in the foregoing paper is the oversight

* American Journal of Pharmacy, 1875, p. 481.

† American Journal of Pharmacy, 1878, p. 470.

‡ Reproduced from American Journal of Pharmacy, Nov., 1875, as represented by Mr. John C. Burt.

made in neglecting to state whether the hydrochloric acid was added to the percolate until it was in *strong excess* (see p. 113).*

If it is only added until a decided acid reaction ensues, the natural combination in which the berberine exists is but partially overcome, and a large amount of berberine remains in solution. This is a feature that manufacturers of these alkaloids have to guard against, for if a considerable proportion of berberine is left in the mother liquid, it is largely thrown down with the hydrastine, and after being associated in this manner, its removal is difficult (see p. 134). Hence it follows that, if this precaution is not observed, the second precipitate by Mr. Hale's method is exactly as he describes it, but the yellow substance, as we have every reason to believe, is impure berberine.

The experimenter must also not overlook the fact that the alkaloids, hydrastine and berberine, are not the only substances thrown from solution by the *excess of ammonia*. A dark-colored, resinous body is also separated, and it adheres with some tenacity to the precipitate.† Thus it follows that, according to our views, also, and according to the results of our experience, a yellow precipitate may be obtained by means of Mr. Hale's process. Before introducing further testimony that we have to offer concerning the nature of this precipitate, we shall call particular attention to the following points:

1st. When ammonia water is added to the percolate until this liquid is neutral, a portion only of the hydrastine precipitates. This percolate contains salts of calcium and aluminium (doubtless from adhering soil), and especially is the hydroxide of aluminium thrown down before the hydrastine, or with the first portions of it. Therefore it may happen that, by exercising care in neutralization, the larger share of the hydrastine may really remain in solution after the liquid ceases to affect litmus paper. The filtration of such a neutral liquid, and addition of excess of ammonia water to the filtrate, produces a precipitate of hydrastine that is much purer than the first precipitate; *providing the operator had taken the precaution to add hydrochloric acid enough to the original percolate to separate the berberine*, and had waited for it to separate before filtering the liquid from the precipitated hydrochlorate of berberine.

If, however, the hydrochlorate of berberine has been but partially thrown down, in consequence of an insufficient amount of hydrochloric acid having been added to the percolate, the second precipitate is of a deep yellow color, and may be mixed with yellow nodules of impure berberine.

If the percolate is very concentrated, the chloride of ammonium may be in sufficient amount to keep the liquid of acid reaction until nearly all of the hydrastine is precipitated.

* Mr. Lerchen, it is true, used the expression, "acidulating it strongly with hydrochloric acid," but he might have considered a decided acid reaction towards litmus as sufficient. In our experience, in order to precipitate all of the berberine possible (and it can not all be thrown down), hydrochloric acid to the extent of one-fourth the bulk of the percolate should be used.

† This substance is of considerable general interest, but it is not desirable to study it in this paper. Prof. E. Scheffer made an interesting line of experiments with it some years ago, and communicated his observations to us, but they have not been completed.

3rd. It is not safe to argue that because a distinct acid reaction (with HCl) will precipitate most of the berberine from an aqueous solution of pure berberine, and because a slight alkaline reaction is sufficient to throw down all of the hydrastine from an aqueous solution of pure hydrochlorate of hydrastine, these results will necessarily follow with an aqueous percolate of hydrastis. This liquid differs in solvent powers from pure water, and the natural combination in which these alkaloids exists is far stronger than any artificial union that we have been able to make by associating them together, after they have been purified. Indeed, we have no reason to hesitate in saying that we have failed to find satisfactory evidence to disprove the supposition that berberine and hydrastine exist in the rhizome as a double salt.

4th. If Mr. Hale's process of adding ammonia water in fractions, one to neutralization and the other to excess, produced two precipitates, why will not the immediate addition of a strong excess of ammonia throw down these two as a mixture? If such a mixture is obtained, it should contain the third alkaloid.

It has been our experience to work some thousands of pounds of hydrastis each year for the alkaloids. We obtain by this process a precipitate that contains hydrastine, berberine, and some other products, but we have not been able to purify the crystallizable yellow third alkaloid.

We have, also, time and again, followed Mr. Hale's directions, while working large amounts of the drug. We obtain a second precipitate, but by appropriate methods the yellow, bitter substance resolves itself into berberine.

Method of Separation.—There are several processes whereby this object can be accomplished, but one of the most successful is as follows:

Dry the precipitate, powder it, and then extract it with boiling alcohol and filter, which will leave the hydroxides of the alkaline earths; distil most of the alcohol and add the syrupy residue to several times its weight of water acidulated with sulphuric acid; filter and precipitate the filtrate with an excess of ammonia water; collect this precipitate, dry, and powder it. Then mix it with ten times its weight of cold alcohol and acidulate with sulphuric acid. The hydrastine dissolves, forming sulphate of hydrastine, while most of the berberine remains insoluble as sulphate of berberine. Collect and wash the precipitate, and purify it by re-crystallizations from hot alcohol. The product is sulphate of berberine. By collecting the residues, of the various steps, treating them again in the same manner, and repeating the operation, the crystallizable bitter yellow substance can be mostly separated, and will also be found to be berberine.

The hydrastine of the alcoholic solution contains still considerable berberine, which can be separated by repeated crystallizations.* By this method the two alkaloids can be separated from each other and from the associated im-

*We do not wish to be understood as saying that berberine is the only yellow substance present in the crude precipitate. It is not, for resinous and other bodies exist in it. To our experience, however, impure berberine is the only body that conforms to the third alkaloid.

purities; the berberine crystallized as sulphate of berberine, the hydrastine as the pure alkaloid. The result of one experiment of this kind, in which the precipitated crude hydrastine from several hundred pounds of hydrastis had been well washed with water, is recorded as follows:

Ninety-six ounces of crude precipitated hydrastine yielded $3\frac{1}{2}$ ounces of pure crystallized sulphate of berberine, and 79 ounces of crystallized hydrastine. The residues did not seem to contain any substance to conform with the third alkaloid. Thus it happens that each attempt we have made to obtain this substance has failed.

Naturally, others have been interested in the matter, and, although we have questioned manufacturers of alkaloids, none have yet to our knowledge obtained it. Prof. Edward S. Wayne informs us that he has not been successful. Mr. J. W. Forbes, who for some years worked hydrastis in considerable quantities, recently denied its existence.

In order to determine if by any oversight of manipulation we were being misled, we laid the result of our work before Prof. A. B. Prescott (Mr. A. K. Hale was in his class at the time he made his determination), and sent to Prof. Prescott a sufficient quantity of the percolate to go over the matter. His investigation did not terminate successfully, and he kindly wrote us to that effect; remarking that this alkaloid doubtless should be ranked among the substances that had been recorded without sufficient examination.

Finally, we made a lot of the crude precipitate according to Mr. Hale's process; purified it, and separated the yellow crystalline sulphate (berberine), from the white alkaloid (hydrastine); and then sent a portion of each in a perfectly pure form to Prof. F. B. Power; and the yellow sulphate to Prof. Virgil Coblentz. Neither of these gentlemen were aware of the method employed in producing them, and their combustions supported each other. The yellow substance had the composition $C_{20}H_{17}NO_4 \cdot H_2SO_4$; the white crystals were $C_{22}H_{23}NO_6$.

Having thus reviewed this subject, we can only answer Mr. Hale's query by saying that the substance obtained by his process is, in our opinion, a mixture, and that the yellow crystalline body is impure hydrochlorate of berberine. We think that Mr. Hale's error has been caused by the small amount of hydrastis used in the investigation, which we understand was less than five pounds, and we believe that, had he obtained the substance in sufficiently large quantities, he would, in purifying it, have discovered its complex nature.

Other Constituents of Hydrastis.—There are additional constituents, some of which are of considerable interest in a general way, but none have come into use in medicine.

A fluorescent body exists in very small amount, and adheres to the hydrastine with considerable tenacity, but is mostly separated during the last crystallizations. It is soluble in chloroform, and is more soluble than hydrastine, in cold alcohol. Its solution in cold alcohol is colorless, but with a

strong blue fluorescence. If we mistake not, it has been recorded that hydrastine possesses fluorescent properties, but our experience is to a contrary effect. When crude hydrastine in considerable amount is dissolved in acidulated water, and the solution is rendered alkaline with ammonia water, sufficient of this principle remains in solution to impart a deep blue color. Since it presents fluorescent properties in alkaline solution instead of in acid liquids, it may be the same as *æsculin*, which substance is asserted to be identical with the fluorescent principle of *Gelsemium sempervirens*.

Among the products that precipitate in making berberine and hydrastine when the liquid from which the alcohol was distilled is mixed with water, are a greenish oil and acid bodies that may prove of considerable interest, as shown by Prof. E. Scheffer, who had them under consideration some time ago.

Hydrastine and berberine exist in natural combination with at least one acid, of a purely sour taste, which we obtained in considerable amount as a syrupy solution, but just as we completed its purification our laboratory and all its contents were destroyed by fire. We made it by throwing out the sulphuric acid from the refuse of sulphate of berberine, by means of carbonate of barium, and after purifying the barium salt of the vegetable acid, decomposing it with an exact amount of sulphuric acid. We shall repeat the experiment.

It is to be presumed that some of the other products of hydrastis will prove of great interest to the investigator.

Powdered Hydrastis.—The consideration of this substance would naturally follow that of the drug, but we have thought it best to first introduce the constituents of hydrastis, inasmuch as the quality of the powdered rhizome really depends upon the proportions of these substances. The history of our powdered drugs is, in many instances, not an inviting one, and hydrastis seems not to have escaped the stigma that is affixed to many other substances of this nature. It is true that, as a rule, the price of the rhizome is but a trifle, and yet it may perhaps be safely said that where there is a desire to cheapen a drug, it matters little how cheap it may be, something can be found to mix with it that is less expensive. However, we do not accept that an inferior powder must necessarily be deficient in quality from an intentional adulteration. The remarks we have made in the preceding pages, regarding the variation in quality of crude hydrastis will indicate that the powder may really be from the rhizome of hydrastis; unmixed with extraneous substances and still be of inferior quality. If a worthless drug is employed the powder can not be an improvement on the crude material. It is true, we think, that the inferior qualities of many American drugs may find their way into commercial powders. This, doubtless, was true to a greater extent formerly than at present. In our opinion wholesale druggists generally desire to furnish the better qualities of all drugs, crude or powdered. That they can not always do so is perhaps largely because it is understood too often that the value of a given drug is the same, regardless of its quality; and none will

deny the strong competition that the price brings to bear on dealers. Pharmacists are, in our opinion, more careful than formerly, and by the united efforts of these two bodies of men, pharmacists and jobbers, we doubt not that the progress towards a better day will continue. If we are correct, the present day is far in advance of a few years ago. We doubt if the time has ever been in the history of this country (since pharmacists commenced depending on dealers for their powdered drugs), that the qualities were equal to those of the present. The causes for an inferior powdered hydrastis, aside from intentional admixture, are the same as for the inferior drug. In considering the powdered hydrastis of commerce, should we, therefore, compare it with the average quality of the crude material such as is accepted without objection by a good pharmacist, or, with the choicest that can be obtained?

We must now leave this matter with the reader to judge as to the attention that is given this subject by pharmacists at large; but it seems to us that a dealer in a substance like powdered hydrastis can not be very severely criticised for supplying an inferior powder (shown to be inferior by analysis), if the same quality of crude hydrastis is accepted without objection by those who should act as authorities. It would be out of place for us to argue the question here, as to whether the standard of powdered hydrastis should be higher than that of the drug, but this phase of the question can with propriety be applied to other American drugs. It is a subject that will confront us before many years.

The description of hydrastis, as given in the United States Pharmacopæia, is not such as can afford a standard of comparison. There is no recognition of the powdered drug in that work, and no standard for the crude other than that derived from a description of the physical appearances.

In 1882, Mr. C. B. Allaire presented a report to the American Pharmaceutical Association, in which he records the microscopic examination of eleven specimens of commercial powdered hydrastis, all of which were adulterated. Mr. Allaire informs us, in a communication, that many of these specimens had been intentionally mixed with extraneous substances, but that in some instances the admixture was an earth that might have been present in the unwashed drug. However, it constituted such a large percentage that it could only be viewed in the light of an adulterant.

In 1883, Mr. E. C. Bassett, then in the chemical laboratory of the University of Michigan, examined, by the microscope, eighteen specimens of commercial powdered hydrastis. Of these, twelve were unadulterated; three contained a little curcuma as a coloring; one was about one fifth curcuma; one a mixture of curcuma and bean starch; and one curcuma and a foreign root that could not be identified. Thus it appears that two-thirds of these specimens were free from admixtures.

However, while the microscope will detect such foreign substances as may be mechanically added to the powdered drug, or powdered with it, it is obvious that it can not indicate the comparative value of the specimens that

are unmixed; and it is essential that a chemical method of detection be employed under such circumstances. That it can be made readily and simply is demonstrated by the nature of the constituents, and as at present the berberine is considered the important one, a comparison of the proportions of berberine is probably our best method of standardizing the drug.*

Appearance of Powdered Hydrastis.—This powder is not a bright yellow. Upon the contrary, it is usually of a dull yellowish hue, and often with a slight tinge of green. The brown surface of the rhizome and rootlets, and the decayed fragments that are always more or less intermixed with the crude drug, destroying the rich yellow that would otherwise be a characteristic; and thus, if commercial powdered hydrastis is a bright yellow, it is perhaps open to suspicion. Powdered hydrastis has the characteristic odor of the rhizome, as described on page 85 of this publication.

Estimation of Berberine in Powdered Hydrastis.—The remarks that we have made in the preceding pages on the berberine subject will indicate that a method of estimating this alkaloid under one condition may perhaps be unreliable under certain other circumstances.

We shall not consume time in this place with the difficulties that accompany the processes that we have tried; for in the future we must consider this alkaloid in a broader field than it occupies in this one plant, and our remarks will then be more pertinent. The fact that it is associated with one, and perhaps, other alkaloids, necessitates a scheme that will disentangle it from such associations or combinations, and it is desirable also that the scheme should be as simple as possible and as easily applied as is practicable. We prefer the following process: †

Reduce the hydrastis to an impalpable powder, if it is not already in that condition, and then macerate one part of the powder with eleven parts of officinal alcohol, shaking often. After four days permit the powder to subside completely, and decant the overlying liquid. Add to the magma sufficient alcohol to produce the original bulk, and repeat the operation. Repeat the maceration with a third portion of alcohol and decant as before. Mix these decanted liquids, and after twelve hours filter them, washing the filter paper with a little alcohol. Add to the filtrate one-third its bulk of officinal sulphuric ether, and then hydrochloric acid to the extent of three-tenths, and sulphuric acid to the extent of one-tenth the weight of the hydrastis employed. Place the liquid, after mixing well, in a cool place, and after forty-eight hours collect the crystalline precipitate on a filter paper and wash it with a mixture of equal parts of sulphuric ether and alcohol until the crystals are free from uncombined acid; then dry it at a temperature of 125° Fah. and weigh it.

* Since this sentence was in type, the investigations of eminent medical authorities have drawn attention particularly to *Hydrastine*, and the indications are that this alkaloid may become the most important constituent.

† The berberine is not as completely extracted by this as by a process that we shall introduce at a future day; but for simplicity this process is desirable.

This process practically abstracts from the hydrastis its berberine, and precipitates it almost completely and as a nearly pure salt. It is true that some may prefer to employ percolation, but to our experience, in unskillful hands the process of maceration is less likely to be followed by variation in product. We do not deny that some berberine remains in the drug, for by another process the extraction is more perfect; but this process will answer as a method of comparison.

The addition of the sulphuric ether to the alcoholic solution produces a menstruum in which, if acidulated as we direct, the hydrochlorate of berberine is so nearly insoluble as to leave no trace of bitterness after separation of the salt.* It must be also observed that, while this process is capable of precipitating a larger amount of berberine than can be obtained by the process we use in making hydrochlorate of berberine (see p. 113), it is less economical on a manufacturing scale, for the increased yield is more than counterbalanced by the expense of the ethereal menstruum; and at the usual price of hydrastis it is false economy to carry the extraction of the drug beyond a limit that is sufficient to repay in yield of berberine, the loss of material and the time consumed. Hence, in connection with our remarks on page 137, in which we present the average economical yield of berberine from ordinary commercial hydrastis, we record the following table, which gives us the comparative qualities of powdered hydrastis, as found in the American market:†

TABLE SHOWING THE EXAMINATION OF FORTY-NINE SPECIMENS OF COMMERCIAL POWDERED HYDRASTIS.

Specimen	1	yielded from 60 parts	Powdered Hydrastis	1.34	parts Berberine Hydrochlorate, equalling 2.23 per cent.				
do	2	do	do	1.335	do	do	do	2.22	do
do	3	do	do	1.26	do	do	do	2.10	do
do	4	do	do	1.25	do	do	do	2.08	do
do	5	do	do	1.25	do	do	do	2.08	do
do	6	do	do	1.23	do	do	do	2.05	do
do	7	do	do	1.21	do	do	do	2.04	do
do	8	do	do	1.19	do	do	do	1.98	do
do	9	do	do	1.19	do	do	do	1.98	do
do	10	do	do	1.18	do	do	do	1.96	do
do	11	do	do	1.16	do	do	do	1.93	do
do	12	do	do	1.15	do	do	do	1.91	do
do	13	do	do	1.12	do	do	do	1.86	do
do	14	do	do	1.12	do	do	do	1.86	do
do	15	do	do	1.10	do	do	do	1.83	do
do	16	do	do	1.10	do	do	do	1.83	do
do	17	do	do	1.10	do	do	do	1.83	do
do	18	do	do	1.08	do	do	do	1.80	do
do	19	do	do	1.08	do	do	do	1.80	do
do	20	do	do	1.08	do	do	do	1.80	do
do	21	do	do	1.08	do	do	do	1.80	do
do	22	do	do	1.08	do	do	do	1.80	do
do	23	do	do	1.05	do	do	do	1.75	do
do	24	do	do	1.04	do	do	do	1.73	do
do	25	do	do	1.04	do	do	do	1.73	do
do	26	do	do	1.01	do	do	do	1.68	do

* Hydrastis contains coloring matters besides berberine, hence the liquid is not decolorized.

† This line of experiment was instituted by Mr. Leslie Soule in our laboratory, the method of investigation being in accordance with the scheme announced on preceding page. The specimens came from Indianapolis, Philadelphia, Little Rock, Louisville, Zanesville, South Bend, Ind., Pottsville, Pa., Chillicothe, O., and Lynn, Mass. Equal amounts of each were operated upon, and all carried simultaneously until the work was completed.

Specimen 27 yielded from 60 parts Powdered Hydrastis 0.98 parts Berberine Hydrochlorate, equalling 1.63 per cent.									
do	28	do	do	do	0.97	do	do	do	1.61
do	29	do	do	do	0.97	do	do	do	1.61
do	30	do	do	do	0.97	do	do	do	1.61
do	31	do	do	do	0.94	do	do	do	1.56
do	32	do	do	do	0.94	do	do	do	1.56
do	33	do	do	do	0.91	do	do	do	1.51
do	34	do	do	do	0.90	do	do	do	1.50
do	35	do	do	do	0.85	do	do	do	1.41
do	36	do	do	do	0.83	do	do	do	1.37
do	37	do	do	do	0.83	do	do	do	1.37
do	38	do	do	do	0.79	do	do	do	1.31
do	39	do	do	do	0.70	do	do	do	1.16
do	40	do	do	do	0.70	do	do	do	1.16
do	41	do	do	do	0.62	do	do	do	1.03
do	42	do	do	do	0.61	do	do	do	1.01
do	43	do	do	do	0.57	do	do	do	0.95
do	44	do	do	do	0.54	do	do	do	0.90
do	45	do	do	do	0.35	do	do	do	0.58
do	46	do	do	do	0.31	do	do	do	0.51
do	47	do	do	do	0.24	do	do	do	0.40
do	48	do	do	do	0.21	do	do	do	0.35
do	49	do	do	do	0.205	do	do	do	0.34

REMARKS.—It will be observed that the yield of hydrochlorate of berberine varies from 2.23 per cent. to 0.34 per cent. Twenty-seven of the specimens were below the average working yield (1.8 per cent.) of fresh commercial hydrastis, as recorded on page 137, and seventeen specimens were above it. Five of the specimens gave the exact amount. It may safely be said that the specimens below this were inferior, for a quality of hydrastis that yields 1.8 per cent. by our working process will assay considerably better; and our experience is that the average assay of berberine hydrochlorate is not less than 2 per cent. That it may be above this is shown by the first seven specimens of our table. Averaging, however, those recorded above 1.8 per cent., we have a result of 1.98½. The powdered hydrastis of commerce should, in our opinion, not only reach this figure by this process, but assay 2 per cent. Allowing, however, for age and imperfect rhizomes, which some may contend should have a consideration, we may possibly lower the figure to 1.95 per cent. It will be observed that of the 49 specimens assayed but 10 reached this standard and 7 were actually less than one per cent. Of these very low specimens we can only say that, even though gathered in early spring-time and imperfectly cured, we have never met with so small a yield of berberine from hydrastis, and there is but one inference in regard to the matter. The pharmacist who purchases such a powder pays an exorbitant price when quality is considered. The physician who prescribes such a drug can not hope for a positive action.

To sum up, accepting the berberine as a standard, commercial powdered hydrastis as found in the drug market of this country is nearly four-fifths below grade, and a very considerable porportion of it is certainly adulterated with foreign bodies, or it may be with the dried and powdered hydrastis muck from which the alkaloids have been extracted.

*The Detection of Curcuma in Powdered Hydrastis.**—Solution of caustic potassa with curcuma gives an immediate deep orange brown coloration which, in the course of a few hours, assumes a decided purple hue. With pure powdered hydrastis no change occurs. In mixtures of the two the deepness of both the primal and ultimate colors is in direct proportion to the curcuma. Hydrochloric acid furnishes a somewhat lighter orange red which slowly fades to a pink with curcuma, but no coloration whatever with the pure

* Mr. E. S. Ely made in our laboratory a series of examinations of hydrastis, curcuma, and admixtures of hydrastis with curcuma and such indigenous drugs as we have found associated with hydrastis. This interesting paper is to be found in the Druggists' Circular, May, 1885, and in acknowledgment of his work, and that of Mr. Soule, we herewith extend our thanks for their value to this publication. The necessity for the introduction of the test for curcuma is evident from Mr. E. C. Bassett's investigations (see page 144).

hydrastis. In mixtures of the two the same colors are produced as with curcuma alone, but varying in density according to the percentage of the latter. The caustic potassa solution is much the more delicate test of the two, giving immediate and distinct colorations where the acid entirely failed. The best method to conduct the foregoing tests is to place about a drachm of the suspected powder upon white filtering paper, and then carefully drop sulphuric ether upon it until the coloring matter is well extracted and diffused over the surface beyond the powder. The ether is allowed to evaporate, when a drop of caustic potassa or hydrochloric acid is added to the colored portion of the paper. A coloration will follow if curcuma is present, as described under tincture of hydrastis.

This test is so delicate as to actually show an admixture of one part of curcuma with 10,000 parts of hydrastis, a perceptible delicate red color appearing at the margin of the spreading alkaline liquid as it passes through the ether stain.

The Detection of Curcuma in Tincture of Hydrastis.—Saturate white filtering paper with the tincture, and allow it to dry. Upon the addition of solution of caustic potassa an immediate orange brown color is produced which gradually assumes a purple hue if curcuma is present, the colors being more or less deep according to the percentage of the latter. Tincture of pure hydrastis is not affected when treated likewise. If a small amount of the suspected tincture be placed in a test tube and caustic potassa added, the orange brown coloration quickly appears if the curcuma is present, even where the paper test fails. Pure tincture of hydrastis, under the same conditions, is not discolored, but rendered turbid, owing to an alkaloidal disturbance. Concentrated hydrochloric acid colors curcuma paper prepared from the tincture a deep reddish brown, which gradually fades to a pink. The hydrastis paper furnishes no coloration. In the test tube, hydrochloric acid furnishes an intense cherry red liquid with the curcuma tincture, but only renders the tincture of hydrastis slightly turbid, and finally a crystalline mass of hydrochlorate of berberine separates, with no coloration. In each of these tests upon mixtures of the tinctures of hydrastis and curcuma, the colorations and their intensity are directly proportioned to the percentages of curcuma.

These reactions are conclusive, and may be summed up as follows: Neither hydrastis nor tincture of hydrastis affords the color reactions of curcuma or tincture of curcuma. If celastrus root be mixed with the hydrastis, the potash reactions of curcuma may be masked, as the former affords a black or deep brown coloration, according to its percentage, that might predominate the orange brown and purple of curcuma. In this case the hydrochloric acid test serves to detect the latter, since with it the celastrus gives but a very slight reddish coloration, with no pink after-color.

We scarcely consider it necessary to consume more time with this subject. Our work supports the report of Mr. Allaire and Mr. Bassett, and we doubt not that if our pharmacopœia revisers find it advisable to standardize hydras-

tis, the act will be followed by an improvement in the quality of the commercial drug.

PHARMACEUTICAL PREPARATIONS.—*Fluid Extract of Hydrastis*.—The present officinal process for making this fluid extract is as follows:

“Hydrastis, in No. 60 powder, one hundred grammes, alcohol, water, each a sufficient quantity to make one hundred cubic centimeters.

“Mix three parts of alcohol with one part of water, and, having moistened the powder with thirty grammes of the mixture, pack it firmly in a cylindrical percolator; then add enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed, gradually adding menstruum, until the hydrastis is exhausted. Reserve the first eighty-five cubic centimeters of the percolate. By means of a water-bath, distil off the alcohol from the remainder, and evaporate the residue to a soft extract; dissolve this in the reserved portion, and add enough menstruum to make the fluid extract measure 100 cubic centimeters.”—U. S. P., 1880.

This produces a very bitter, dark-colored liquid of a reddish yellow color in thin layer, and upon shaking the bottle that contains it, a deep yellow stain remains where the liquid adheres to the glass. When freshly prepared it is transparent, but it sometimes becomes of a muddy appearance by age. If it be prepared of prime hydrastis, and perfectly percolated, a deposit follows, often within a few days of the time of its preparation. In cool weather, especially if the fluid extract was prepared (as it should have been) in a warm location, this precipitate is abundant, forming a deposit that will perhaps occupy one-fourth the bulk of the liquid. This sediment is largely made up of yellow crystals, and in very cold weather beautiful spangles of crystals form upon the inside of the container. This crystalline sediment is a berberine compound, and in accordance with its production the berberine value of the solution decreases. For this reason, a fluid extract of hydrastis that has precipitated in this manner should be shaken before using it. If it be heated, the sediment mostly dissolves, to re-precipitate when cooled. Taken altogether, we do not feel that the officinal fluid extract of hydrastis is a very acceptable pharmaceutical, but by the crude and simple method of percolation it may be difficult to obtain a more satisfactory liquid by using any menstruum that is a mixture of alcohol and water. Within three weeks' time a specimen that had been made under our direction, very carefully, from prime hydrastis, lost 18.85 per cent. of its berberine by precipitation.* Hence we should not expect the commercial fluid extracts of hydrastis to be of uniform strength even when made of standard hydrastis.

Test.—Transparent fluid extract of hydrastis, when added to a mixture

* Mr. W. M. Schmitt made, in our laboratory, a number of determinations of the berberine in commercial fluid extracts. This paper will be found in the *Pharmaceutical Record* during 1885, and is of considerable interest. The variation in percentage of berberine announced by us as taking place inside of three weeks from the time of preparation was in a standard fluid extract made by Mr. Schmitt.

of alcohol three parts and water one part, should form a transparent mixture. It should produce a yellow crystalline precipitate (hydrochlorate of berberine) when mixed with one-fourth its bulk of hydrochloric acid; and a dirty yellowish brown sediment (impure hydrastine) when mixed with an excess of ammonia water. It should yield at least two per cent. of berberine salts by the following assay process:

Mix one fluid ounce of fluid extract of hydrastis with two fluid ounces of a mixture of equal bulks of sulphuric ether and alcohol, and after twenty-four hours decant the overlying liquid. Dissolve the precipitate in two fluid drachms of dilute alcohol, and add one fluid ounce of a mixture of alcohol two parts and sulphuric ether one part, by measure. Allow to stand twenty-four hours, and again decant the overlying liquid and mix with the reserved portion. Then treat the precipitate with one fluid drachm of the above mixture for three successive times, mix with the reserve and filter the mixture. To the filtrate add two fluid drachms of muriatic acid and one-half fluid drachm of sulphuric acid. After an exposure of twenty-four hours in a cool location, separate the crystalline precipitate by means of a filter paper, wash it with a mixture of equal bulks of alcohol and sulphuric ether, until the free acid is removed; then dry it by exposure in a drying closet to a temperature of 125° Fah. and weigh immediately. The yield should not be less than two per cent. of the hydrastis employed; it may reach three and one-half per cent.* Curcuma is detected by the methods given under powdered hydrastis, using the fluid extract instead of the tincture.

Fluid Extract of Hydrastis without Alcohol.—We object to the foregoing name. If applied to the substances originally introduced, and which the liquids sold under the above name are designed to imitate, it is a misnomer. They certainly were not fluid extracts. The earliest record that we have of such a preparation was about 1874, when the writer prepared for topical purposes a liquid that was to be free from alcohol, and transparent. It gave excellent satisfaction, and came into quite general use, finally being thrown upon the market under various names to distinguish it from the officinal fluid extract. We believe it to be fully as efficacious, and a preferable pharmaceutical, as it is more permanent, and miscible without precipitation with either syrup, glycerine, water, wine or alcohol.

Preparation.—Percolate powdered hydrastis with officinal alcohol until the hydrastis is exhausted. Add to the percolate one-third as much by weight of water as there was of the hydrastis, and evaporate the alcohol. After all the alcohol is driven off, mix with the residue enough cold water to bring the entire weight to two-thirds that of the hydrastis. After twenty-four hours, filter the liquid, and add to the filtrate enough glycerine to bring to the weight of the hydrastis employed.

* If the hydrastis is prime, and the percolation complete, a larger amount of this berberine salt is obtained than by our process (p. 145) for assaying powdered hydrastis. The berberine salt is not as pure, however, and we usually prefer the other method for a direct estimation of hydrastis.

It will be observed that by this simple process the desirable constituents of the hydrastis are extracted by means of the alcohol, without the gums and inert extractive matters; although the oil and resins are associated in the percolate. The subsequent evaporation of the alcohol and admixture of the residue with water precipitates the oils and resins which are then separated by filtration. Thus a very pure solution of the natural alkaloidal constituents of hydrastis is obtained, and the addition of the glycerine produces a menstruum from which they do not separate by standing, and which will not ferment. This pharmaceutical, in our opinion, and we have made some thousands of pounds of it, is preferable to the officinal fluid extract. It can be administered whenever that substance is indicated and as an injection, or wash, is admissible in many cases when the fluid extract can not be employed. We hope that a similar preparation may become officinal. It will be observed that the process is such as to forbid the name fluid extract, unless the product is made officinal under that term, and we believe that the proper location is among the liquors. We therefore prefer the name *Liquid Hydrastis*, having used it for many years. We reproduce our description of this pharmaceutical as follows:

"Liquid hydrastis has a beautiful, deep yellow color, and when shaken, stains the bottle clear yellow. The taste is bitter, but not unpleasant and nauseating, like some bitter drugs. There is no odor of alcohol, none being present, but it possesses the exact odor of fresh powdered hydrastis. It will mix with water, glycerine, wine, or syrups, in any and all proportions, and the mixtures will not become turbid. It will not ferment, and the freezing point is much less than that of water. It contains all of the alkaloids and acids of hydrastis, in their natural combinations."

Tincture of Hydrastis.—This is officinal, as follows: "Hydrastis, in No. 60 powder, twenty parts. Diluted alcohol, a sufficient quantity. To make one hundred parts.

"Moisten the powder with fifteen parts of diluted alcohol, and macerate for twenty-four hours; then pack it in a cylindrical percolator, and gradually pour diluted alcohol upon it, until one hundred parts of tincture are obtained."—U. S. P., 1880.

The chief feature in connection with this pharmaceutical is the difference in menstruum used in it and that of fluid extract of hydrastis. If this tincture were designed for a different purpose than the fluid extract, this change would perhaps be obvious; or, if the menstruum of either were incapable of extracting the increased, or decreased amount of hydrastis of the other. In our opinion, tincture of hydrastis should be made of the menstruum employed in producing the fluid extract, for the increased amount of alcohol will not affect its administration.*

* When admissible, we favor a uniformity in the menstruum that is used in making both the tincture and fluid extract of a given drug. Conditions may possibly exist in which a break is necessary, but we think that as a rule it will be found that a menstruum best adapted to making one of these preparations is the one to use with the other.

Essence of Hydrastis.*—The Pharmacopœa Homœopathica Polyglotta recognizes this preparation as follows: The rhizome (fresh root) is pounded to a fine pulp and weighed. "Then two parts by weight of strong alcohol are taken, and after thoroughly mixing the pulp with one-sixth part of it, the rest of the alcohol is added. After having stirred the whole well, and having filled it into a well-stoppered bottle, let it stand for eight days in a dark, cool place. The essence is then separated by decanting, straining and filtering."

MEDICAL HISTORY.—The root of this plant was highly prized as a dye by the North American Indians on account of its yellow coloring matter, and also for its medicinal value; but Kalm, in 1772, Cutler, in his *Indigenous Vegetables*, 1783, and Schoepf, in his *Materia Medica Americana*, 1785, overlooked it. This seems remarkable when we consider the important position that hydrastis occupied with the various tribes of Indians and with our settlers. Although the Indians introduced hydrastis to the whites (see medical properties), and it has always been a domestic remedy, it was reserved for Barton to bring the plant before the medical profession. The first medical reference that we have been able to find occurs in Barton's *Collections for a Vegetable Materia Medica*, 1798 (part first), wherein credit for its introduction is given the Cherokee Indians. In the third part of this work, page 13 (1804), he devotes considerable attention to the drug, and mentions the fact that it "supplies us with one of the most brilliant yellow colors with which we are acquainted." From this date until the appearance of Rafinesque's *Medical Flora of the United States*, 1828, nothing of importance was published in medical literature, and nothing added to Barton's remarks. His statements were either copied verbatim or condensed by writers upon *materia medica*, although few gave him any credit for his work.† Rafinesque next (1828) devoted considerable space to this plant, and produced a rude figure of it.‡

In 1833 a paper from the editor of the *Thomsonian Recorder* appeared in that work (Vol. I., p. 397) which was the most important communication we have been enabled to find to that date. This paper gave a synopsis of the previously ascribed values of hydrastis, and added the uses Dr. Thomson made of it and the position it occupied in Thomsonian practice.§

* This essence, or mother tincture as it is called, of hydrastis is the only pharmaceutical preparation of hydrastis used in homœopathic medicine, and peculiar to homœopathists. From it, in the usual manner, their dilutions are made. Homœopathic physicians use the alkaloidal salts defined by us in preceding pages.

† Captain Lewis (of the Lewis and Clarke expedition) attached a paper to his herbarium specimens of *Hydrastis canadensis*, May 24th, 1804, in which attention is called to the fact that "it is said to be a sovereign remedy" in eye diseases, and prized by the inhabitants of the country where it grows. This paper was not published until 1834, when it appeared in the *American Journal of Pharmacy*, p. 201.

‡ This figure has been reproduced, time and again, by subsequent authors, and in no instance have we found a credit given to Rafinesque's work. His engravings seem to have been considered as common property; and few, if any copyists, had the courtesy to acknowledge the source.

§ Hydrastis seems not to have been a conspicuous remedy of the early Thomsonians. It was mentioned in a paper which appeared in the *Thomsonian Recorder*, 1834, p. 313, entitled, "The *Materia Medica* of Dr. Samuel Thomson's Guide and Narrative, being a correct catalogue of all the plants recommended by him," but it occupied little space in his works. Many of Thomson's early followers scarcely recognized it. Comfort's "Practice of Medicine on Thomsonian Principles" gives but a brief notice of hydrastis.

Beach introduced hydrastis into the first edition of his *American Practice of Medicine* (1833), and it has always been an important member of the *materia medica* of his followers.*

The *United States Dispensatory*, first edition, 1833, omitted hydrastis, but the second edition, 1834, gave it a brief consideration in the appendix.†

Between this date and 1852 the standard works upon *materia medica* usually noticed the plant, but very briefly, and really added nothing to the preceding literature. Short extracts were usually made from the works of Barton, Rafinesque, Beach, or Thomson, the selection of authorities being usually in accordance with the affiliations of each writer. Hydrastis had, however, at this time become a recognized remedy. In 1852 King's *Eclectic Dispensatory* appeared, and hydrastis was highly recommended as an *Eclectic* remedy, in the following language: "This remedy is peculiar to Eclectics, and ranks among their best articles." In that work the medical uses and properties of hydrastis were prominently drawn by Prof. King, thus bringing the plant conspicuously before the *Eclectic* section of the medical profession. About this date interest was excited in certain products of the plant which were at that time commencing to be liberally advertised. These facts, together with frequent contributions from physicians who wrote for the *Eclectic Medical Journal of Cincinnati*, produced an extensive demand for the plant and its products, although this demand was almost exclusively among Eclectics. Hydrastis rapidly became more popular, however, and soon overstepped the bounds of sectionalism. In 1860 it was made official in the *United States Pharmacopœia*.

In the *Regular* section of medicine, Prof. Roberts Bartholow has given considerable attention to hydrastis, as is indicated by his paper on the subject in the various editions of his *Materia Medica*, and our readers are indebted to this author for a communication that follows regarding the uses of hydrastis. In 1862 hydrastis excited interest sufficient to merit a paper from Prof. Bentley, of England, under the heading, "New American Drugs," which appeared in the *Pharmaceutical Journal and Transactions*, 1862, p. 540, but which was mainly devoted to a consideration of the proximate principles of the plant. This is the only important foreign contribution we have in the early medical literature pertaining to this plant, although in 1873 Dr. Van der Espt presented a lengthy paper to the *Royal Society of Medicine and Natural Sciences*, Brussels, Belgium, without, however, adding any new facts; and recently the plant has excited some little attention in Germany.‡ It has

* Hydrastis was in reality brought out by the Eclectics, and is often known as an *Eclectic Remedy*. Prof. John King has valued it since 1833. The late Wm. S. Merrell introduced its products perhaps more extensively than any other person. In connection with this subject, it should be recognized that Dr. Walter Beach and the early Eclectics worked together.

† This unimportant notice passed unchanged through nine editions of that recognized authority, and was only slightly enlarged in the tenth edition, 1854, occupying still a position in the appendix. In the twelfth edition, however, it was placed in the primary department, the plant having been honored by an official position in the *Pharmacopœia* of 1860.

‡ The recent literature upon the therapeutics of hydrastis will be considered in the medical contributions of our contributors.

steadily grown in favor, all schools of medicine use it, and many members of each school value it very highly. The converse is also true, and many physicians neglect it, while others do not use it at all.

MEDICAL PROPERTIES (HISTORY).—In 1798 Prof. B. S. Barton issued the first part of his "Collections for an essay towards a *Materia Medica* of the United States." In it he writes, p. 9: "I am informed that the Cherake † cure it [cancer] with a plant which is thought to be *Hydrastis canadensis*." In the third part of his "Collections," 1804, he again refers to *hydrastis*: "The root of this plant is a very powerful bitter" (p. 13), and says (p. 14): "The *hydrastis* is a popular remedy in some parts of the United States. A spirituous infusion of the root is employed as a tonic bitter in the western parts of Pennsylvania, etc., and there can be no doubt that both in this and in other shapes, our medicine may be used with much advantage. An infusion of the root in cold water is also employed as a wash in inflammations of the eyes." †

Hand (House Surgeon, 1820,) adds: "It may be given in form of powder or of strong tea made by boiling, in indigestion, the secondary stages of low fevers, and all cases of weakness in general."

Rafinesque's *Medical Flora*, 1828, Vol. I., pp. 253 and 254, supports the foregoing, and in addition states that "they [natives] also employ it for sore legs and many external complaints as a topical tonic. Internally, in infusion or tincture, in disorders of the stomach, the liver, etc. It appears to be slightly narcotic and available in many other disorders. Some Indians employ it as a diuretic, stimulant and escharotic, using the powder for blistering § and the infusion for dropsy." In Elisha Smith's *Botanic Physician*, 1830, we find several compounds containing *hydrastis*, to-wit: "Stimulating Cathartic Powders," "Bone's Bitters," and "Tonic Powders." Howard's *Improved System of Botanic Medicine*, 1832, p. 327, recommends it, also, in dyspepsia. Beach (1833), *American Practice of Medicine*, states that in connection with tonic properties it is "at the same time laxative, which makes it very appropriate in dyspeptic disorders." Next, the edition of the *Thomsonian Recorder* of 1833, p. 398, reviewed the medical properties as previously announced by others, and added to them as follows: "The importance of this article, taken in teaspoonful doses, for the relief and removal of bowel complaints in children should be extensively known. It is not only a corrector of the stomach, a regulator of the bowels, and a vermifuge for children, but it is an admirable remedy for the peculiar sickness attendant on females during their periods of utero-gestation, called morning sickness. It admirably relieves stomachic oppression, nausea, and heart-burn." Of the use of *hydrastis* in

* Cherokee Indians.—ED.

† Rafinesque's *Medical Flora*, Vol. I., 1828, p. 253, adds: "It is considered a specific by the Indians for that disorder." Captain Lewis, 1804, supports the above, saying: "It is said to be a sovereign remedy in a disorder common to the inhabitants of the country where found, usually termed *sore eyes*."

‡ This must be a mistake; *phytolacca*, or *sanguinaria*, will blister, but *hydrastis* can not be used for this purpose.

sore eyes he writes: "It is not a decoction of the dried root in boiling water that relieves ophthalmia, but is the freshly dug root, well cleansed and bruised, and infused in cold, soft water, that is to be particularly relied upon."* Sanborn's Medical Botany, 1835, p. 63, states that the Indians use hydrastis as a diuretic. If the root be chewed it will cure white aphtha or ulcers in the mouth.† Kost (Elements of Materia Medica and Therapeutics) states that it is good as an application in infusion to inflammations of the mucous tissues, leucorrhœa, blenorrhœa, etc., and is of value in erysipelas. Dunglison (Medical Dictionary, 1852, p. 450) is the authority for a statement to the effect that in Kentucky hydrastis is used as an outward application in wounds.‡

In 1852 Prof. John King issued the first edition of his dispensatory, under the title, "The Eclectic Dispensatory of the United States of America," and therein gave the medicinal uses of hydrastis a more careful review than had previously been awarded, although many of the values that early writers had ascribed to the plant were omitted as being overdrawn. § The indications for the administration and use of the drug and its preparations were carefully discussed in that work, and the remedy was thereby brought legitimately before the Eclectic branch of the medical profession (see Medical History), and in consequence of its general adoption by Eclectics it was from that time generally known as an Eclectic medicine. King was first, that we can find recorded, to recommend the plant in gleet and chronic gonorrhœa, and he wrote: "I have used this preparation likewise with much success in incipient stricture, spermatorrhea, and inflammation and ulceration of the internal coat of the bladder." From that time hydrastis was a popular remedy. It became officinal in 1860, and it now occupies a higher position than at any previous day, and the Homœopathic branch of the medical profession also use it extensively, as is shown by Prof. Hale's paper on the subject.

* In contradiction to the fresh root part of this statement we quote from Captain Lewis, 1804. In speaking of the eye troubles of the settlers, he remarks as follows: "This disease is a violent inflammation of the eyes, frequently attended with a high fever, and sometimes terminates in the loss of sight, always gives great pain, and continues for a length of time in most cases. The preparation and application of this remedy is as follows: Having procured a sufficient quantity of the roots, wash them clean and suffer them to dry in the shade, break them with the fingers as fine as you can conveniently, put them in a glass vessel, taking care to fill it about two-thirds with the broken root, add rain or river water until the vessel is filled, shake it frequently and it will be ready for use in the course of six hours. The water must not be decanted, but remaining with the root is to be frequently applied by wetting a piece of fine linen and touching the eyes gently with it."—Am. Journ. Pharm., 1834, p. 201.

† We have testimony to the fact that in portions of Kentucky hydrastis is the domestic remedy for ordinary forms of sore mouth. The patient simply chews small fragments of the root from time to time. After chewing the root, if the saliva be applied to indolent sores, beneficial results are said to follow.—L.

‡ We have an extensive acquaintance in several sections of Kentucky, and have known of infusions of hydrastis being applied to indolent ulcers as a stimulant, but have never known it used on fresh wounds.

§ It is too true that many of these assertions regarding the uses of a drug are unsupported by a single fact that will bear the light. Empiricism in medicine seems to have been a necessity, for our most valued remedies have been handed down to us by men who scarcely recorded a systematic line of investigation. Indeed, we must go back to the aborigines time and again. It is to be hoped that the day will come when medical men as scientists will unite to demonstrate facts, to glean the grain from the chaff. Then as this or that statement is verified or disproved, we trust that a spirit of charity will prevail for those who were misguided, for these same men will be found to have announced many valuable truths.

We have endeavored in the foregoing pages to give a plain, systematically connected record of the introduction of hydrastis into medicine, and its past uses. Modern investigations have disproved many of the statements of other times, but writers still differ considerably from each other, and there is yet room for investigation. This plant is of such importance as to merit more attention than our brief medical record, and we are pleased to present the following independent papers from leading representatives of the various bodies of practitioners.

THE PHYSIOLOGICAL EFFECTS AND THERAPEUTICAL USES OF HYDRASTIS.— (Written for this publication by Prof. Roberts Bartholow, M. D., LL. D., of the Jefferson Medical College of Philadelphia.)*—But little attention has, heretofore, been given to the physiological actions of hydrastis. It is true Schatz,† Felluer, Sclavatinsky, and some others,‡ have made some studies, but their results differ so widely from those herein detailed that it may be questioned whether they operated with sufficiently good specimens of the drug. The alkaloid hydrastine with which the following experiments were made was sent to me by Prof. J. U. Lloyd, the editor of this journal, who is, I hope I may be permitted to say, unimpeachable authority. As hydrastine is quite insoluble, a solution of the hydrochlorate was prepared for me by Messrs. John Wyeth & Bro., which contained 33 per cent. of the salt. The effects of the alkaloid were compared with those of the fluid extract. As the actions of hydrastis consist of the sum of the effects of its active constituents, it is necessary to know how far each contributes to the results. It was soon ascertained that the alkaloid hydrastine is the true active principle—for the very characteristic effects of this were simply repeated by sufficient doses of the fluid extract. The latter is, as might be expected, slower in action, but in respect to the manner of action there was between them no appreciable difference. Three grains of the hydrochlorate caused the death of a frog in four minutes, whilst forty minims of the fluid extract proved fatal in twelve minutes, the mode and character of the action being the same. The results in rabbits were corresponding. In general terms, the effects of hydrastis are those of hydrastine in both classes of animals, but minute differences may hereafter be detected on closer examination.

General Effects of Hydrastine Hydrochlorate in Cold-Blooded Animals.—When ten minims of the 33 per cent. solution are injected into the abdominal cavity of a frog, the following phenomena ensue: In two minutes, muscular rigidity is manifest, with extension of the limbs and inability to move; in three minutes the cutaneous reflex is so heightened that the gentlest tap on the skin causes a tonic convulsion from above downwards; successive tonic convulsions then ensue, with fibrillary trembling between, until at the end of

* Dr. Bartholow desires to acknowledge his indebtedness to Dr. A. B. Brubaker, Demonstrator of Physiology in the Jefferson Medical College, for valuable assistance in conducting the experiments.

† Centralblatt für gesammte Therapie, Band 2, p. 82.

‡ Meditz. Horz. No. 16, 1884. Quoted from the London Med. Record for November 15, 1884.

four minutes death occurs in a strong tetanus. On opening the chest, the heart is still found in action, but in a few minutes more ceases in diastole, all the cavities being full of blood, and its muscular tissue is found to be irresponsive to electrical irritation.

In a rabbit weighing about fifty ounces, forty minims of the same solution, or thirteen grains, caused death in five minutes with the same phenomena—that is, with successive tetanic convulsions, the head drawn forcibly back, the limbs extended, and the respiration fixed, with increasing cyanosis of the ears and mouth. The heart continues in action after respiration has entirely ceased, and on opening the chest then it is still found in slow movement, the auricles most active and all the cavities distended with blood. The muscular tissue of the heart, does not respond to electrical or mechanical irritation.

It follows from the foregoing that hydrastis belongs to the group of excitomotor agents. It heightens preception, the cutaneous excitability and the reflex functions, and it causes death by tetanic fixation of the respiratory muscles.

Determination of the seat of the actions, whether spinal or peripheral.—A frog weighing about twelve ounces was pithed. After division of the medulla, the whole length of the spinal cord was carefully destroyed. No other injury was done, and very little blood lost. Ten minims of the hydrastine solution were then thrown into the peritoneal cavity. The frog remained perfectly limp and flaccid, and no spasm or convulsion of any kind occurred. The heart, on opening the chest some time after the death of the frog, was no longer in movement, the action having ceased in the diastole, and the cavities, as in other instances, were distended with blood.

The spasms and convulsions caused by hydrastine are, therefore, central or spinal, and not peripheral.

Has hydrastine any effect on the peripheral nerves and muscles?—To ascertain this, the left sciatic nerve was dissected out, isolated and a strong ligature applied around the limb the nerve excluded, thus cutting off the circulation from the parts below. Ten minims of the hydrastine solution were now thrown into the abdominal cavity. The usual effects followed—stiffness, rigidity and spasm of the muscles, general tonic convulsions, and intermediate fibrillary contractions. On stimulating the sciatic of the ligatured limb, contractions, not active, of the gastrocnemius followed; but on direct excitation of the unpoisoned muscles of the calf, they responded readily. In the other, the poisoned limb, feeble contractions of the calf muscles ensued on stimulation of the nerve, and similar contractions took place when these muscles themselves were directly acted on. After a time when the influence of the hydrastine had attained the maximum, and immediately after suspension of respiration, both nerves failed on stimulation to excite muscular contractions, and the poisoned muscles became entirely inexcitable.

The foregoing experiments prove that hydrastine exhausts the irritability of motor nerves and muscles.

Action of Hydrastine Hydrochlorate on the Heart.—A freshly removed frog's heart suspended in the solution, rapidly loses its electric excitability, and in a minute no longer responds to a strong current. Applied to the exposed heart *in situ*, the same effect is produced more slowly, and in five minutes an arrest of the movements takes place in diastole, the cavities being fully distended with blood. The auricles resist the action somewhat longer.

The pneumogastrics being divided, ten minims of the solution are injected into the abdominal cavity. The heart is acted on more slowly, and its excitability to stimulation, electrical and mechanical, although much feebler than the normal, still persists. On excitation of the peripheral end, the heart is rather lazily arrested. In the previous experiments, the heart undisturbed in its anatomical relations, it was found that the excitability of the vagus, just before the cessation of respiration, was entirely destroyed, and at the stoppage of the heart's movements, its muscular irritability was lost.

From these experiments we learn that hydrastine acts both on the inhibitory and motor apparatus, destroying their power of response to excitation, but the former function yields later, or after the latter.

To determine more precisely the nature of the action exerted on the cardiac motor and inhibiting apparatus, the vagus was first paralyzed by atropine, and then the usual dose of hydrastine administered. The increased movement caused by atropine was soon lessened by hydrastine, and the heart, after the cessation of the respiratory movements, was ultimately arrested in the diastole, the cavities fully distended as before described. The effect of the atropine was now exhibited in the preservation of the irritability of the heart muscle. In the experiments before detailed, it was found that hydrastine destroyed the irritability of the heart muscle, but when atropine was administered, the response to mechanical and electrical irritation was retained.

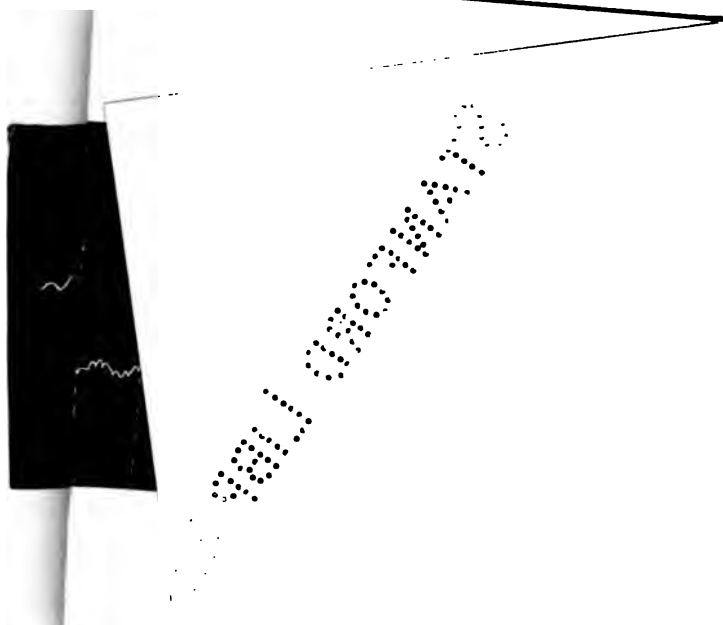
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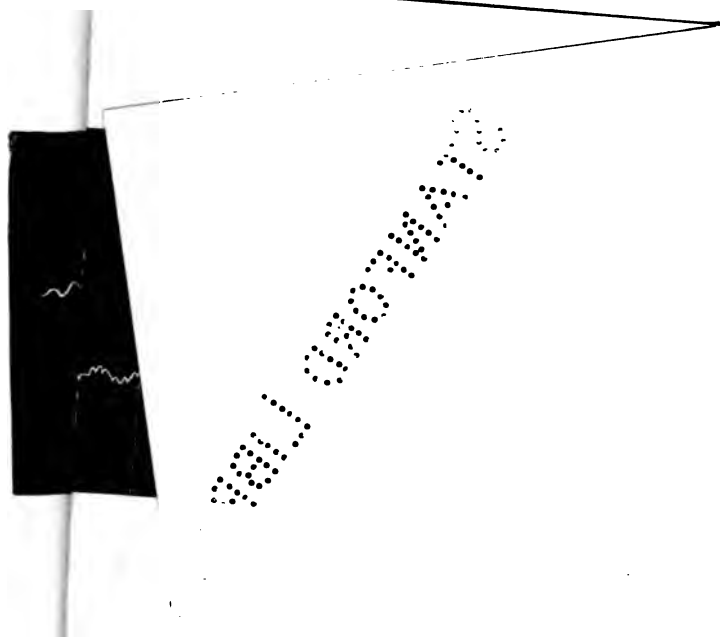
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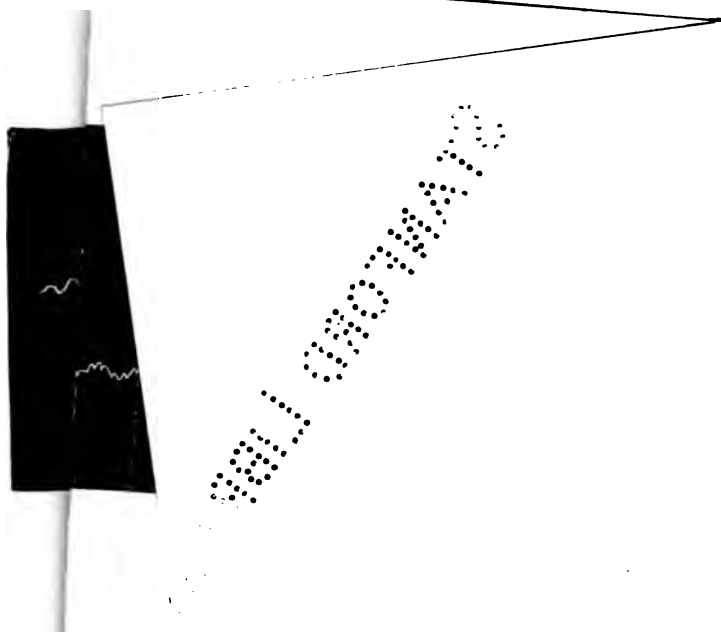
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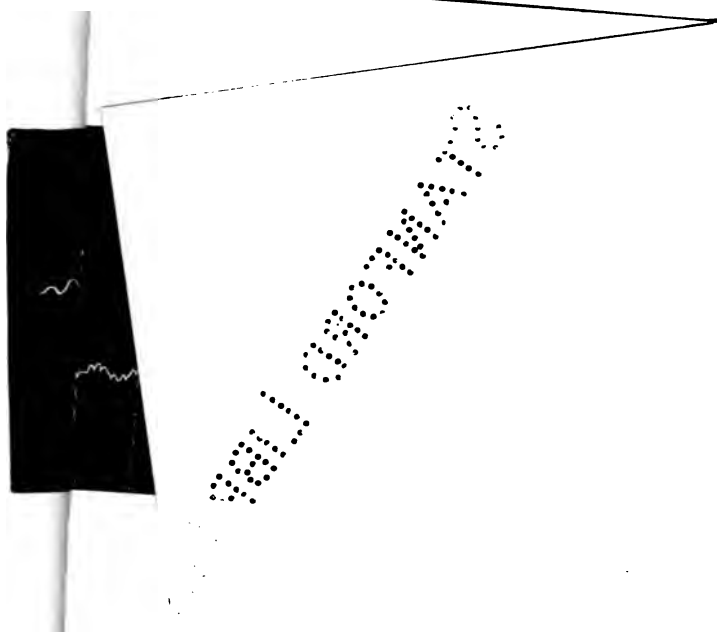
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The Therapeutical Applications of Hydrastis.—As the results obtained from the administration of hydrastis constitute the sum of the actions of its several constituents, it may be best to consider the powers of the active principles separately, before treating of the effects of the drug as a whole.

The plants containing berberine are, as a rule, members of the tonic and reconstituant group. Hydrastine being peculiar to hydrastis, much of the effect produced by this agent must be due to the presence of this principle. Prescribed alone, hydrastine has been supposed to have the effects of a tonic, antiperiodic, and to some extent alterant—a term used to signify the power to promote the waste and excretion of morbid materials. The physiological study of hydrastine, as made by Schatz, Fellner, Slavatsky, and others,* has not contributed to the subject of its therapeutical power, although it forms a groundwork for the therapy of the future. If, however, the physiological actions as detailed in this paper be confirmed by subsequent researches, quite a new phase will be given to its therapeutical applications.

As the fluid extract contains all the constituents of hydrastis, it is the most concentrated form available for administration and, therefore, will be the best preparation for procuring the effects of the remedy as a whole, whether given by the stomach or applied externally:

Hydrastis in Gastro-Intestinal Disorders.—As a stomachic tonic, when the condition of the stomach is that of debility, as we find it in atonic dyspepsia, so-called, and in convalescence from acute diseases, hydrastis serves a useful purpose. In common with the bitters, it stimulates appetite and increases the secretion of the gastric glands. Disposing thus of an increased supply of aliment, the constructive metamorphosis is promoted. For this purpose, it is best to administer ten to twenty drops of the fluid extract a few minutes before meals.

Both the alkaloids of hydrastis, exerting an inhibitory influence on fermentation, the fluid extract can be given with excellent effects in cases of catarrh of the stomach accompanied with fermentative changes in certain foods, whether or no, the *Sarcina Ventriculi* be present. The result of the action will be more permanent than the above remark implies, seeing that this remedy can modify, if not remove, that alteration of the mucous membrane

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which is accompanied by an outpouring of pathological mucus. To effect this purpose it were better to administer the fluid extract, two or three hours after meals, and the dose should range from fifteen to thirty minims.

As a tonic and reconstituent in the classes of cases above mentioned, quinine is now largely used: it is quite certain that hydrastis can be substituted for the most part with advantage.

The experiments of Rutherford* have confirmed the belief, founded on empirical observations, that hydrastis is an hepatic stimulant, although not one of the most active. As he operated with "hydrastin" so-called, which consists for the most part of berberine, it is probable that the results which he obtained are not equalled by those produced by the exhibition of the fluid extract. Hydrastis has been found useful in gastro-duodenal catarrh, associated with catarrh of the bile ducts—a morbid condition in which the output of bile is lessened by the mechanical obstruction, and the intestinal digestion is impaired in consequence of the insufficient supply of bile, the fermentative changes set up by the mucus which plays the part of a ferment, and the consequent absorption of imperfectly prepared materials. In this state of things we find the true explanation of some cases of jaundice, of most cases of "biliousness," and the initial changes of lithaemia.

The gastro-duodenal catarrh of chronic alcoholism is a condition in which the use of hydrastis has a decidedly beneficial effect, and the improvement in the digestion has seemed to lessen the appetite for alcoholic stimulants. This statement, made by several observers,† has been rather sarcastically commented on by the authors of the National Dispensary,‡ who are, however, pessimistic if not nihilistic in their therapeutical conceptions. The new facts, demonstrating the effects of hydrastine as a spinal stimulant, are additional reasons for supposing it to be possessed of the powers claimed.

For the relief of the intestinal troubles above mentioned, the fluid extract of hydrastis should be given in the interval between the meals, and the dose should be larger (ʒss—ʒi) than in the case of the corresponding stomachal troubles.

As an antipyretic and antiperiodic, the alkaloid—hydrastine—has had no adequate clinical study. Twelve years ago, I made some experimental trials at the Hospital of the Good Samaritan, in Cincinnati, in seven cases of tertian intermittent. White hydrastine in crystals was furnished me by Prof. E. S. Wayne, M. D., of Cincinnati, the well-known chemist and pharmacologist. Two of the cases were recent, uncomplicated, and but a few paroxysms had occurred. Twenty grains of hydrastine, administered in three doses, in anticipation of the seizure, merely modified its violence, but did not prevent it in either case. The second attempt proved successful. Three of the cases more chronic in character required sixty, sixty-five and eighty grains respect-

* The British Medical Journal, 1879, Vols. I. and II. Report of the Committee of the British Med. Association, etc.

† The Practitioner, London, Vol. XVI., p. 121, *et seq.*

‡ Third edition, p. 798.

ively. The two remaining proved still more rebellious, and the patients becoming uneasy, I was forced to resort to quinine. The supply of pure hydrastine was not sufficient to carry on further experiments, and a suitable opportunity to resume the investigation not occurring, I have no further clinical experience in this direction to report.* Nevertheless, these trials, whilst not numerous, are at least significant. They indicate the possession of real antiperiodic power, inferior to quinine, it is true, but apparently inferior only to the great antiperiodic. Since that time, the chemist's skill has produced by synthesis various products approaching in composition closely to quinine, and possessed of powers very similar but still inferior. It may be that under these circumstances, hydrastine will never rival quinine or its analogues, but the powers which it is now shown to possess may require a different statement hereafter.

Topical Applications.—For local use, the best mode of applying hydrastis is in the form of the fluid extract, which may be employed undiluted or diluted with glycerine. Its staining power is an objection, since the color which it imparts to cotton cloth, if not permanent, is at least not readily washed out.

The fluid extract of hydrastis is an excellent topical application in cases of catarrhal inflammation of the mucous membranes. In nasal, faucial, urethral and vaginal catarrh, and in otorrhœa and conjunctivitis, there can be no doubt of its good effects. It may be applied freely in the undiluted state without fear of injury, if no good be accomplished by it. It has proved to be a very efficient injection in gonorrhœa, more especially after the acuter symptoms have subsided. For this purpose it may be diluted with glycerine or mucilage, or both, to the required extent. Formerly when I used to see these cases in considerable numbers, I found it a capital application in cervicitis. I had, also, excellent results in such cases, and in gonorrhœa, from "hydrastine" suspended in mucilage.

To express a final judgment as to its therapeutical value, my conviction is that hydrastis is a useful remedy, and well deserves a trial in the various conditions in which it is recommended above.

THE HOMŒOPATHIC USES OF HYDRASTIS CANADENSIS.—(Written for this publication by Edwin M. Hale, M. D., Emeritus Professor of Materia Medica and Therapeutics in the Chicago Homœopathic College.)—This indigenous drug, first introduced into our school by myself in 1856, has since obtained a great popularity. Many provings and physiological experiments have been made with it, which, combined with an extensive clinical experience, have pretty clearly defined its sphere of action and its place in homœopathic therapeutics.

* The remarkable activity of the pure hydrastine furnished me by Prof. Lloyd, necessitates caution in its administration, until its lethal power in man can be determined. It is now evident that the hydrastine used by me formerly in the treatment of diseases was not pure. I must therefore caution my readers in respect to the administration of the pure alkaloid, and especially its salts, and warn them not to employ this active agent, as they have heretofore been giving berberine, or a mixture of hydrastine and berberine.

Its sphere of action, although not wide, is yet very important. It appears to me to have a decided and specific affinity for

(1) The mucous surfaces—especially those with which it may come in contact.

(2) The mucous glandular system.

(3) The nutritive system.

(4) The circulatory system.

Action on the Mucous Surfaces.—The natural secretion is at first increased; then it becomes abnormal in quantity and quality. At first clear, white, tenacious and transparent, it becomes yellow, thick, green and even bloody, but always tenacious, capable of being drawn out in long strings. In this respect it resembles the mucus discharge caused by *kali bichromicum*, *ammonii bromidum* and *cubebs*. It differs from the mucus flux of *stannum*, *copaiva* and *ammonii chloridum*, which is thick, lumpy and falls in masses. This primary mucous flux of *hydrastis* may pass on to erosion, muco-purulent discharge and ulceration. It probably causes this condition by inducing a primary capillary hyperæmia; next a passive stasis, together with a stimulation of the mucous glands. Finally, from exhaustion or atrophy, the sources of the secretion are cut off, and the mucous membrane becomes dry, glazed, ulcerated and its functions destroyed. Pathologically, this disease of the mucous membranes may be called catarrh, or blenorrhœa. Other medicines cause similar conditions when taken internally, not only in the mucous surfaces with which they come in contact, but through which they may be eliminated (*copaiva*, *kali iodidum*, *cubebs*, *grindelia*, etc.); but we have as yet no proof that *hydrastis* is eliminated through any mucous surface, such as the bronchii, urinary or generative tract. If it acts on these surfaces at all when taken internally, it must act on them by disturbing the circulation in the capillaries. I have never been able to cure blenorrhœas of the above named surfaces by its internal administration, unless it was used at the same time topically; but I do not mean to dispute its ability to do so. Certain it is that we get the best curative effects when it is locally applied to diseased mucous membranes. We have used it successfully in mucous conjunctivitis; otorrhœa; diseases of the eustachian tubes; catarrh of the nasal passages, pharynx, fauces, stomach, intestines, part of the gall duct, urethra, vagina, uterus (leucorrhœa, gonorrhœa, etc.). These catarrhal affections may be simple, or severe, and may extend to erosions or ulceration. If they begin in simple blenorrhœa, they are all amenable to the curative action of *hydrastis*.

Method of Application.—When topically applied we use the tincture, or the muriate of *hydrastine*. The so-called “liquid *hydrastis*” is probably the best preparation. The infusion of the powdered root, when strained or filtered, is very efficacious. The strength of the lotion should vary according to the nature of the disorder, and the amount of the irritability of the surface. When the mucous membrane is red and irritable, a few drops of the tincture, or “liquid *hydrastis*,” or gr.i of the muriate, to the ounce of water is sufficient.

In chronic or torpid conditions the strength may be increased to \mathfrak{z} i of the fluid preparations, or gr.v of the muriate, to \mathfrak{z} i of water. It may be applied with a syringe, atomizer, or as a simple wash, or on bougies (in urethra or uterus), or with a brush (in pharyngitis or conjunctivitis).

Action on the Skin.—The skin being analogous to mucous membrane, it has been supposed that a drug which acts on the one would act similarly on the other. One of our provers records that it caused an erysipelatous rash on the face, neck, hands and fingers, with great heat and irritation, which continued for six days, when the skin exfoliated; others that it caused pustular eruptions. Now the cutaneous analogues of a mucous catarrh, are erythema, moist eruptions, eczema, and even ulcers. In domestic as well as homœopathic practice it has been used successfully in similar skin affections. We have recorded cures of lupus, psoriasis, excoriations, rhagades, ulcers, boils, and even variola.

It was once highly praised as a remedy for cancer, but I can not find any authentic reports of its successful use when used alone. It was generally mixed with chloride of zinc, or some other escharotic.

Action on the Nutritive System.—The Eclectics have always believed hydrastis to be a general tonic. Our experiments seem to show that it acts similarly to cinchona, columbo, gentian, berberis, and others of that class. When given in medicinal doses of the crude drug, it seems to increase the general tone of the organs of nutrition and assimilation. The appetite is increased, digestion is more vigorous, and the bodily weight and strength increases. But if the drug is continued too long, the improvement ceases, and retrograde processes set in. A gastro-intestinal catarrh obtains, digestion fails, assimilation is deficient, constipation and hepatic torpor are present. All tonics, even iron, act similarly when the doses are too large or are continued too long. In these facts we see that hydrastis and its analogues are homœopathic to debility, atony, retrograde metamorphosis, and that the drug should be used in small (not infinitesimal) doses, and not continued too long even in small doses.

It is curative in all disorders depending on the above conditions: namely, generally impoverished blood, emaciation, stomatitis, dyspepsia, indigestion either in the stomach or intestines, biliousness, constipation, etc. The action of hydrastine on the liver was established by the experiments of Rutherford, who calls it "a hepatic stimulant of considerable power, and but a feeble intestinal stimulant." He refers to its purgative power. Hydrastis is not a purgative in any sense. It may cause during its first effects some looseness of the bowels, owing to the increase of mucus, but as the catarrh increases the intestines become sluggish, obstructed and very constipated. English Homœopaths value it more highly than do those of America as a remedy in hepatic torpor and constipation. They find it very useful for hæmorrhoids, congestion of the liver and portal system, sallow, dirty skin, and jaundice. I have found it useful for "mucous piles," as well as "bleeding piles." In

large doses it first causes acute hyperæmia of the liver, but this is followed by passive venous stasis of that organ and of the whole portal system.

On the lymphatic glandular system its action is not yet proven. I doubt if it has any.

Action on the Muscular System.—Hydrastis acts as a tonic. I do not think this acts through the nervous system, as does nux vomica, but through the blood. The increased assimilation of well-digested food allows the muscles to be better fed and better nourished. If the theory of Prof. Schatz, hereafter referred to, be true—that hydrastis acts directly on the muscular coats of the blood-vessels, contracting them—why should it not act on each and every muscular fibre in the body? Not, perhaps, to contract them, but by imparting a peculiar form of tonicity.

But in whatever way it may act, it has been the observation of all practitioners who have used hydrastis, and particularly the muriate of hydrastine (salt of white alkaloid), that the first signs of improvement mentioned by patients is the increase of muscular strength and powers of endurance, and this, too, in chronic, incurable diseases.

While I believe hydrastis to be a powerful tonic and restorative, I am obliged to deny it any specific anti-periodic (anti-malarial) properties. I tested it thoroughly during a practice of fifteen years in a malarious district. It is not and can never be a rival or substitute for cinchona. The practical physician knows that all bitter tonics have some reputation in ague, *e. g.*, chelone, ostrya, euonymus, and others; but they are not anti-malarial medicines. They may be, and doubtless are, capable of removing the malarial cachexia, in which the recuperative forces of the system are too feeble to resist the habit of recurring paroxysms, which are not true ague paroxysms. All these bitter tonics, particularly hydrastis and its active principles, berberine and hydrastine, have the power of restoring the vital forces sufficient to overcome this habit. In this respect hydrastis is more than a rival of cinchona (which is worse than useless in the cachexia)—it is a most valuable substitute. In all cachexias hydrastis is an indispensable remedy. Even in anæmia and chlorosis, it greatly aids iron in restoring the integrity of the blood.

In the debility after wasting diseases, fevers—typhoid or gastric; after losses of blood, or due to depressing emotions, also in neurasthenia, the hydrastia berberine phosphate or hypophosphite have done me excellent service. We have found it very useful in gall-stones, not so much for the colic caused by their passage as to remove the tendency to their formation. It may dissolve the biliary concretions by causing a flow of thinner bile, or aid in their expulsion by removing (as in jaundice) the catarrh of the gall duct. Several German Homœopaths have reported cases of tumors of the stomach and pylorus which disappeared under the careful and protracted use of hydrastis.

It is a curious fact in the history of our indigenous remedies that just about the time we think we understand all their qualities, and know all their uses, some foreign physician discovers new qualities and new uses for them.

This is partly true of hydrastis. I have recently read a lecture delivered before the Gynæcological Section of the Congress of German Philosophers and Physicians, held at Freiburg, in 1883, by Prof. Schatz, of Rostock, Germany. He gives as a result of his investigations that "hydrastis acts on the mucous membranes by contracting the vascular system."

But such a condition must be due to its action in large doses, and must be followed by its secondary effects, which would be of an opposite character, namely: passive congestion of these tissues. This action can not, however, account fully for its blenorrhagic effects. It must have some other action, especially when locally applied, and this action I am sure is that of an irritant to the glands of the mucous membranes. It probably has, in crude quantities, a double and simultaneous primary action, namely: contraction of the vascular supply, and irritation of the glandular supply. This vascular tension will after a time be followed by vascular relaxation; and the acute primary blenorrhagia by a chronic blenorrhœa with tissue paresis.

Further, Prof. Schatz says that "in many particulars, hydrastis and ergot are not unlike, but not infrequently hydrastis is efficient in cases of hæmorrhage where ergot is powerless, or even of positive injury, as also in some cases of myoma. It appears to me that we can attribute the action of hydrastis to the contraction, pure and simple, of the blood-vessel-wall, thereby lessening the congestion of the genital organs, while ergot spends its action on the muscular fibres of the uterus." "In the non-gravid uterus," he says, "the continuous administration of hydrastis causes a retardation of the menstrual period, with a diminution of the amount; it causes the pain to be less; even in menorrhagia and dysmenorrhœa of virgins, without any local causes, when pain is absent. Its action in myoma is often quite remarkable. Hæmorrhages caused in this manner diminish very much, or disappear entirely, after the use of hydrastis— even where Bombelin's ergotine has been employed most energetically; I have observed a number of times that where hydrastis had been administered to virgins for menorrhagia, normal menstruation set in, and occasionally the catamenia did not make their appearance for one, two or three months." This result was caused by massive doses. Prof. Schatz gives twenty drops of the fluid extract four times a day, causing, we may presume, the extreme primary effects of the drug. He does not give a differential comparison of the effects of hydrastis and ergot, which would be of great value and interest, but he admits, or implies, that he is not yet able to make such a comparison.

The best authorities describe the action of ergot to be as follows: "The action of the heart becomes slower, and an enormous rise takes place in the blood-pressure. This influence on the circulatory system modern research has shown to be due to the action of ergot on the vaso-motor system; it increases the action of this system, and causes a contraction of the arterioles."

Again, it is said to diminish the blood-supply to the cerebro-spinal axis, to the vegetative organs, the skin and muscular system. It is therefore diffi-

cult to explain the difference in the action of the two drugs, unless we suppose that hydrastis acts directly on the blood-vessel walls and not through the vaso-motor centers. But we doubt if this can be the case. There are many symptoms of hydrastis, in our meager provings of it, which indicate that it also diminishes the blood-supply of the brain—as witness the “tinnitus aurium, vertigo, dimness of vision, roaring in the head, with dull headache; a ‘narcotized’ feeling in the brain, feeling as if intoxicated; terrible headache and vertigo, horrible dreams.”—Hale’s New Remedies, third edition.

It is possible that a more heroic series of provings would evolve more vaso-motor symptoms, but when we consider the large quantities, continued for a long time, used in Eclectic and domestic practice, such a supposition does not seem probable.

But, while its full and true action is yet unexplained, we may take advantage of clinical experience to teach us the action of the drug and its value in certain diseases.

Prof. Schatz, in his memorable lecture, fortifies his statements by the narration of six cases of fibroid tumors of the uterus (myoma), in which he used hydrastis successfully in controlling and curing the hæmorrhages, but he does not say what became of the tumors. We know that not all cases of uterine fibroids are attended by hæmorrhage. If hydrastis acts by diminishing the vascular supply, it ought to arrest the growth of the myoma, or other non-malignant tumors. Now this brings us back to the alleged curative power of hydrastis in cancer. I have carefully examined all the records of our school relating to the use of hydrastis in tumors and cancer, and I can not find a single case where it entirely removed a cancer, or scirrous growth, before or after the stage of ulceration. But there are cases reported where hard, movable tumors appearing in the breast, stomach and uterus, have decreased in size, or disappeared altogether, after the internal and topical use of hydrastis.

It is my belief, based on a large personal experience and observation, that all the tumors benefited by this drug were fibroid in character, and the result was brought about, not by any “absorbent” action, but by diminishing the supply of blood, and thus cutting off the nutrition of the growth.

Ergot has certainly arrested and diminished the growth of myoma in the uterus, but we do not know that it has acted as well in fibroid tumors elsewhere.

Strychnine has the same action as ergot on the muscular structure of the uterus; so has caulophyllum, cimicifuga, and other drugs, but we do not hear of them as being of value in fibroid and other growths in the uterus.

Hamamelis, trillium, turpentine, phoradendron, millefoil, and others, act as well as ergot in controlling hæmorrhages, but we do not know them to be useful in any kind of tumor.

These are mysteries of drug action which yet remain unsolved.

It would appear from the foregoing that if the *modus operandi* of hydrastis

is as stated, its analogues are viburnum, ammonium bromide, ammonium chloride, and a few others.

Viburnum arrests and prevents the pain of dysmenorrhœa and hæmorrhages. It is supposed to act on the motor nerves of the uterus, relaxing contractions of muscular tissue. If so, it must act opposite to ergot. How, then, does it arrest hæmorrhage? It would seem that it could not affect the coats of the blood-vessels in a manner opposite to its action on the muscles.

Here is an anomaly which can only be explained by accepting the theory advanced by some Scotch obstetrician, that hæmorrhage from the uterus often arises from undue contraction of the muscles of that organ.

The bromide of ammonium has been found curative in ovarian and uterine tumors. It is capable of arresting hæmorrhage, and acts on the muscular structure of the uterus and its vessels similarly to hydrastis.

Muriate of ammonium has the same specific action on morbid growths, but is not known to arrest uterine hæmorrhage.

The action of hydrastis on the uterus may be said to be unique; it has no close analogue. It is not alone in hæmorrhage from uterine fibroids or myoma that hydrastis is useful. Prof. Schatz reports one case of congestive dysmenorrhœa; six cases of hæmorrhage in virgins, where the bleeding continued after the use of the curette; three cases due to parametritis, cicatrices and contractions; two from incomplete involution of the puerperal uterus; three cases from endometritis and metritis; and five cases of climacteric hæmorrhage. In all these cases various other means, drugs and operations had been used, and failed, but hydrastis performed a cure.

Dr. Schatz warns us to use the proper dose. Too small doses have no action; too large too much effect. The quantity he found generally useful was 20 gtts of the tincture three times a day.

I mention this because the illogical custom of many of our school is to select the dose in accordance with some arbitrary notion or preconceived theory. It is absurd to prescribe ergot in a middle or high attenuation for non-contraction of the uterus; and it would be just as absurd to give 20 gtts of the crude in uterine spasms. The dosage in these cases must be reversed, or it is not curative.

By Dr. Schatz's observations we learn that the sphere of curative action of hydrastis, already wider than we supposed, bids fair to become more and more enlarged, especially in the direction of its action on the circulatory system. If hydrastis increases the tonicity of the muscular fibres of the terminal blood-vessels, it must also increase that of the large arterial and venous trunks, and even of the heart itself. And if it does this without acting on the vaso-motor centers, it must prove far more valuable than ergot, for its effects must be more lasting. It follows that it may prove to be one of the chief remedies, if not *the* remedy, for chronic congestion, or more properly, stasis of the various organs of the body. It may prove to be to the arteries what hamamelis is to the veins, or it may rival the latter in its own

sphere of usefulness. Further experiments and clinical observations are needed to substantiate this theory, but I can safely say that it is my conviction, based on many years' experience in its use, that it is of veritable value in chronic blood stasis in the liver, spleen, uterus, abdomen and portal system. I believe too that I have seen proofs of its value in passive stasis of the brain and lungs, for within the last year or two I have observed excellent results from the use of the hypophosphite of hydrastine in affections of the latter organs. I am sure I have seen its good effects in weakness of the muscular structure of the heart, with tendency to dilatation. It seems to build up the muscular tissue, while digitalis or convallaria regulates the rythm.

I will close this paper by giving an excellent pen picture of the gastrointestinal troubles, for which hydrastis is specific. It is copied from an article written by Dr. Clifton, of Northampton, England:

"*The Facial Expression* is dull, heavy, of a yellowish white color, sodden looking, not unlike that in which mercurius is indicated, but whiter, and having less animation. Though there is in its provings no reference to the expression or complexion, as affording reasons for selecting hydrastis, I have frequently found that when the gastric symptoms calling for this medicine have been present, the character of the face has been as I have described.

"*The Tongue* is large, flabby and slimy-looking. Underneath the fur the tongue is of a bluish white color, having in its edges the imprints of the teeth. So far it is like the mercurius tongue, but lacks the tremulous character of this organ, so often seen in cases benefited by mercurius. The coating is of a yellow, slimy, sticky fur.

"There are morbid states occurring in other organs, to which hydrastis is Homœopathic, but where the appearances of the face and tongue I have described are not present. In the dyspepsia it relieves. Both are met with.

"*The Eructations* are generally sour or putrid, more commonly the former than the latter.

"*The Appetite* is generally bad; the power of digesting bread and vegetables being especially weak. Both are followed by eructations.

"*The Stomach* has a sensation of weight (not as after nux and bryonia, 'weight like a stone'), and with the weight and fullness, an empty, aching, 'gone' feeling, more or less constant, but aggravated by taking a meal. The aching, 'gone' feeling is something like that produced by gelsemium, but is attended by more general fullness of the stomach, and more sour eructations. Further, although the gelsemium tongue is sometimes coated white or yellow, it is not so large and flabby as is the hydrastis tongue. This symptom is, I am aware, produced by many other medicines besides gelsemium, especially by ignatia and cimicifuga, but ignatia and cimicifuga do not give rise to the other symptoms peculiar to hydrastis. In tea-drinkers this symptom occurs frequently, but with them the tongue is generally white (except when colored by the tea), and in their dyspepsia cinchona is often found

to answer better than other medicines, especially in removing the flatulence with which they are commonly troubled.

“ *The Action of the Bowels* may be either infrequent and constipated, or frequent, with the stools loose, soft, light colored, and with flatus. But as a rule the bowels are constipated, and stools lumpy and covered with slimy mucus, in cases indicating hydrastis.”

THE USES OF HYDRASTIS IN THE ECLECTIC SCHOOL. —(Written for this publication by Prof. John M. Scudder, M. D., Professor of the Practice of Medicine in the Eclectic Medical Institute, Cincinnati.)—In some respects the hydrastis has been much over-estimated. It has been recommended as an antiperiodic, but it has but a feeble influence either as a prophylactic or a remedy opposed to malarial disease. It has been recommended as one of the best if not the best of bitter “tonics”—meaning a remedy to increase the appetite, digestion, blood-making and nutrition. But in this it is much overrated, and will not give satisfaction unless a special pathological condition exists.

This brings us to the consideration of the indications for its use, and its contra-indications. It is a remedy in atony of mucous tissues, with increased secretion; it is a remedy in irritation or inflammation of mucous tissues if secretion is free, whether it be mucus or pus. In this case it is a tonic, and improves nutrition, giving a better circulation and innervation. It has been claimed that it relieves irritation and gives tone to the parts, and with the conditions named this is a fact.

In catarrhal gastritis it is tonic and peptic, as it is in intestinal catarrh or catarrhal dyspepsia. It is a good remedy in stomatitis with increased secretion, in acute or chronic pharyngitis, and in some cases of nasal catarrh.

A solution of the soluble salts has proven very useful as an injection in the second stage of gonorrhœa, and in gleet. It is an excellent remedy in disease of the cervix uteri, and in cervical metritis, with profuse secretion from the cervical canal. In these cases the application should be thorough. In ulceration of the rectum it will sometimes prove a most efficient remedy.

In the second stage of purulent conjunctivitis a solution of these salts will give good results, and in some cases of chronic conjunctivitis the effect will be beneficial.

The salts of berberine (sulphate or phosphate), as well as the alkaloid itself are very convenient for dispensing, especially when the physician carries his own medicine. One to four grains to a half glass (℥iv) of water makes an excellent bitter, and with three or four drops of tincture of nux vomica, a good peptic. A collyrium or an injection for the purposes named is as readily prepared.

One use of hydrastis is yet to be named. In some cases of cancer with sloughing of tissues, and in malignant ulceration, no application will do more to retard the progress of the disease than an infusion of the crude article or a solution of the alkaloid. It has been claimed that the internal administration of the remedy will prove curative. I am satisfied that in some cases this use

of hydrastis will do much to relieve pain and to lengthen life even if it does not prove curative.

THE USES OF HYDRASTIS CANADENSIS IN THE ECLECTIC SCHOOL.—(Written for this publication by Prof. John King, M. D., Professor of Obstetrics and Diseases of Women, in the Eclectic Medical Institute, Cincinnati). While as a general vegetable tonic, hydrastis is inferior to certain other bitter tonics, as, gentian, colombo, etc., it will be found superior to them in the treatment of subacute and chronic inflammation of mucous membranes, upon which it exerts a peculiar tonic and slightly astringent effect, whether taken internally, or applied locally. In the majority of cases, its local application is followed by more prompt and positive action than its internal administration. Whether its power of contracting vessels be owing to a tannic acid, or to a principle similar to that in ergot which causes a like effect, has yet to be determined.* Administered internally, it has proved efficacious as a tonic, in enfeebled conditions of the alimentary canal with infants and children; in restoring tone to the intestinal mucous coat after severe attacks of diarrhea, dysentery, and other debilitating maladies; and in removing the indigestion, and restoring the appetite in those cases of indigestion and anorexia of adults due to an abnormal condition of the mucous coat of the stomach. As a local application it has proved valuable in conjunctivitis, in ulcerations of the mouth and fauces, in vaginal and uterine leucorrhea, and in all cases of enfeebled mucous tissues. In the chronic forms of cervical and corporeal endometritis, it has acted with success, being applied in the form of powder, made by evaporation of a decoction of the root, rubbed up with simple cerate or vaseline, and introduced into the uterine cavity by means of a tube made for such a purpose. In combination with other agents, it exerts beneficial influences that can not be had by the employment of either of the articles separately. Thus, a strong decoction of the root, to which has been added one-third or one-fourth its volume of tincture of capsicum forms a successful application to corneal ulcerations, and to all atonic ulcerations of mucous tissues. In ulceration of the bladder, the decoction mixed with an equal volume of decoction of geranium, and injected into the bladder, has effected cures even in cases where all previous treatment had failed. This same decoction has never failed me yet, as a local application in ophthalmia neonatorum. The decoction, employed in combination with decoction of caulophyllum, has been found efficacious in thrush, and aphthæ of infants and children. Berberine, or muriate of berberin, does not appear to possess the positive action upon abnormal mucous tissues that is manifested by the root in decoction, fluid extracts, or a powder made by evaporating the decoction to dryness."

The preceding statement was written some four or five months ago, and placed in the hands of Prof J. U. Lloyd. To my great pleasure and surprise I have just noticed that in the section of Gynæcology in the Congress of naturalists and German physicians, held at Fribourg, in Brigau, Dr. Schatz, of

* Do not confound this with the yellow alkaloid berberine.

Rostock, invited the attention of his colleagues to the American *Hydrastis Canadensis*, the therapeutical effects of which rather astonished him. He found this agent efficacious in hemorrhages from myoma, from congestive dysmenorrhea, from subinvolution, also in those attending metritis and endometritis, as well as those occurring at the period of the menopause. He supposes the medicine acts upon the uterine mucous membrane, exciting vascular contractions, through which mechanism it diminishes congestion of the genital organs, thus acting very differently from ergot, the influence of which is exerted upon the uterine muscular tissue.*

REMARKS.—The foregoing independent papers on the therapy of *hydrastis* and its products, will be of general interest to the medical profession of America. To us, one feature is unexpected, namely, the announcement of Prof. Bartholow that "the alkaloid hydrastine† is the true active principle."

The physiological action of hydrochlorate of hydrastine as demonstrated by Prof. Bartholow is such as to warrant a close clinical study of this salt, which has been heretofore generally neglected. The negative results that followed the investigations of early experimentors, were doubtless owing to the use of the insoluble alkaloid, or impure hydrastine, for the active nature of the salt, as shown by the investigations of Prof. Bartholow, would lead us to infer that the popularity of *hydrastis* and its pharmaceutical preparations is largely owing to a natural salt of hydrastine, modified, perhaps, by the berberine with which it is intimately associated, rather than the reverse. In the plant, this alkaloid, and berberine exist in the form of very soluble salts, and the long accepted uses of *hydrastis* in diseases of mucous surfaces, instead of as a mere tonic, like other berberine yielding plants, would alone indicate that berberine is not the prime factor. Indeed, it has long been known that solutions of berberine were not, in eye diseases of the value of infusion of *hydrastis*. This has always been accepted by Prof. King. This new light would lead to the opinion that the estimation of the value of *hydrastis* by our berberine process was fallacious, and that we should rather estimate the hydrastine of the drug.

Acting, therefore, on the information conveyed by Prof. Bartholow, we placed the hydrochlorate of hydrastine in the hands of several acknowledged authorities of the medical profession, and as a result we are enabled to present the following clinical contributions. It will be noticed that Prof. Sattler, having examined both berberine and hydrastine, also reports that hydrastine is the active agent.

THE PHYSIOLOGICAL EFFECTS AND THERAPEUTIC USES OF BERBERINE AND HYDRASTINE IN OPHTHALMIC AND AURAL PRACTICE.—(Written for this publication by Prof. Robert Sattler, M. D., Ophthalmic Surgeon to the Cincinnati Hospital, etc).—The want of a satisfactory preparation of *Hydrastis Canadensis*, perfectly soluble and free from the well-known objectionable features of

* The balance of this statement as to the form employed, doses, etc., of this medicine, are so nearly similar to those related by Dr. Hale, that we have with Dr. King's consent, omitted them, and refer our readers to the article by Dr. Hale, for further information concerning Dr. Schatz's investigations.—ED.

† Do not confound this with the yellow alkaloid berberine.

the drug, has until recently prevented its more general and extensive use and application in the management of the various catarrhal affections of the eye and ear.

At the request of Prof. J. U. Lloyd, I commenced a series of observations to test the physiological properties and therapeutic uses of two soluble salts of hydrastis, *i. e.*, diberberine sulphate and hydrochlorate of hydrastine, which he kindly furnished me, in powder form and in one, two and four per cent. solutions.

The investigations were conducted at my clinic and the records of the progress and results of the cases in which either remedy was resorted to, were carefully compiled by the clinical assistants, Drs. C. H. Castle and C. R. Holmes.

BERBERINE DISULPHATE.—*Physiological Action.*—Observations were begun with the berberine solutions. Two or three drops of a two per cent. solution dropped into the conjunctival sac caused slight irritation and injection of the palpebral and ocular conjunctiva. The objective and subjective disturbance, however, subsided quickly.

A four per cent. solution excited greater local irritation, more profuse flow of tears and mucous and also more pronounced subjective discomfort. The duration, however, of these symptoms was brief.

Therapeutic Application of Berberine.—To test its efficacy to relieve or modify catarrhal alterations of the conjunctiva (conjunctivitis simplex, acute catarrhal conjunctivitis, etc.), two and four per cent. solutions were resorted to, but in every case the results were negative, or at least, unattended by appreciable good effects, even after prolonged and systematic use.

The principal objection to the disulphate of berberine solution was, not so much the discomfort and irritation it induced, but principally on account of the deep staining (yellow) of the adjacent parts.

The hyperaemia of the conjunctiva, produced by the instillation was too transitory and was not effectual in modifying, after repeated trials, the local symptoms; or in bringing about relief from the scratching and burning sensations produced by the disease. Owing to almost uniformly negative results, additional observations were not made.

If the use of the berberine solutions proved of little or no value in the treatment of catarrhal affections of the eye, the use of both strong solutions and the powder in substance proved absolutely ineffectual when resorted to for the purpose of modifying or arresting catarrhal or purulent discharges from the middle ear.

In the following cases it was applied,—a four per cent. solution dropped into the ear twice a day, after syringing and the insufflation of the powder was resorted to once a day.

Case I. R. H. æt 4. Acute catarrhal otitis media, perforation of membrana tympani, slight discharge. Applied powder and solutions Nov. 2, 3, 4, and 5. The discharge became very profuse during this time, the powder incrustated and caused pain and suffering. Nov. 6, discontinued berberine, and used powdered boric acid, and discharge stopped in two days.

Case II. K. F. æt 16. Chronic otitis media purulenta. First application Oct. 15, continued until Oct. 28. No change of symptoms. Oct. 29, complained of pain in the ear, discharge more profuse. In spite of great care in the introduction of the powder, and the daily cleansing, it underwent incrustation.

Case III. G. B. æt 13, Chronic purulent otitis media. Oct. 26, First application, continued until Nov. 7. No favorable change, incrustation also troublesome.

Case IV. Subacute purulent otitis media. First application Oct. 24. Continued to Nov. 7. In this case there occurred considerable improvement. Incrustation also troublesome.

Case V. Chronic otitis media purulent, was tried for ten days: symptoms became worse.

In a number of other cases the remedy was used, but after several days was abandoned, for the reason that no improvement or change occurred to warrant its continuance.

When resorted to in solution, coagulation or precipitation occurred at once but no pain attended its use. The principal objection to its use in this locality, and this applies particularly to the powder, is, that rapid incrustation, due to chemical transformation from contact with the discharge occurs. The staining of the parts also constituted an objectionable feature. The removal of the incrustated masses from the external canal became necessary, on account of discomfort and pain produced. In some of the cases the removal was tedious, difficult and painful.

HYDRASTINE.—*The Physiological Action and Effects of Instillations of Hydrochlorate of Hydrastine.*—Two or three drops of a two per cent. solution dropped into the conjunctival sac of a healthy eye, causes at once active stimulation of the palpebral and ocular divisions, attended by the usual reflex symptoms—lachrymation, blepharo-spasm, and a pungent and burning pain, which, however, is of short duration, rarely lasting longer than two or three minutes. With the subsidence of the pain, more or less moisture of the eye remains, and a watery mucus secretion often accumulates at the outer and inner canthus. After the expiration of one hour, all evidences of the instillation have disappeared.

A four per cent. solution causes more marked subjective discomfort, more active and persistent hyperæmia of the conjunctival area, more pronounced reflex symptoms, together with increased stimulation of the secretory apparatus. Stronger solutions cause an intensification of all these symptoms, and in addition, probably in consequence of the irritation to the sensory nerves of the cornea, contraction of the pupil. The myosis is most probably the immediate result of the irritation of the superficial sensory nerves of the globe, and is not due to a direct action upon the sensory and muscular structures of the iris.

Cold applications to the lids modify greatly the local symptoms, and also the discomfort attending instillations of weaker solutions; and the application of stronger solutions is greatly mitigated by immediate washing off the conjunctival surfaces with camels hair brush and tepid water. The inferences from a number of trials establishes that in mild solutions, hydrochlorate of hydrastine is a tonic and stimulant to the conjunctiva, increasing for the time

being, its functional activity. It can also be inferred that the remedy exerts its beneficial effects, by its action in arousing and stimulating the functional activity of the complex glandular structures, by the active hyperæmia produced by its instillation. This was corroborated by numerous trials in those cases, in which the remedy was resorted to in variable strength of solution, to accomplish such effects, in diseased states of the conjunctiva, which the instillation into the normal eye rendered probable. It appeared therefore of probable value in those pathological processes of the mucous membrane attended by more or less pronounced passive congestion, relaxation of structure, and altered or suspended functional activity of its glandular apparatus.

In all catarrhal forms of conjunctivitis and in the first or catarrhal stage of more serious lesions, one and two per cent. solutions exerted a beneficial influence on the local symptoms. The secretions appeared less acrid and were reduced in quantity and perhaps altered also in composition; particularly was this observed, if in addition to frequent instillations of weaker solution, an application of a stronger solution five per cent. was made once a day to the conjunctival surfaces of the everted lids, by the aid of a camel's hair brush and the surfaces immediately washed off with water.

In follicular conjunctivitis, an affection quite common among anemic and scrofulous children, and also among adults living amidst unfavorable hygienic surroundings, it was found to possess decided advantages over the customary astringents and local stimulants ordinarily resorted to. The disease is eminently chronic and contagious. In many cases it exists in a latent form and gives rise to little annoyance, or the discomfort is ignored by the patients, until vision is interfered with by the accumulation of mucus and irritation of the lid borders, due to the acrid or irritating character of the discharges. Often it appears in an endemic form in certain localities, and in other instances it affects all the members of one or more families. Lack of cleanliness on the part of the person or persons affected, and the careless use of towels and handkerchiefs by the other members of the family constitute the principal channels of contagion. On account of its chronic course and the general or frequent vitiated state of the constitution of persons affected, it is a most troublesome affection to manage. The use of hydrochlorate of hydrastine solutions in this annoying affection has been particularly satisfactory, and local and subjective symptoms have been effectually modified and the course of this always tedious affection, has been altered and shortened. Compared with other remedies, the subjective discomfort attending its use was less annoying and subsided more rapidly, and the improvement was more lasting.

Therapeutic Application of Hydrochlorate of Hydrastine.—Bearing in mind its local action when instilled into the healthy eye, it was resorted to in a large number of cases in which this action would appear desirable in order to promote, modify, or arrest those local symptoms, which are the common and frequent attendants of acute, subacute and chronic catarrhal, follicular, granular, blennorrhæal, etc., inflammations of the conjunctiva.

In the treatment of chronic catarrhal conjunctivitis, and particularly that variety known as conjunctivitis sicca, it was found of great service. This affection is eminently tedious and annoying, to both physician and patient. Among the most distressing symptoms, is a sensation of dryness and scratching, attended by a feeling of weight and heaviness of the upper lids. A perceptible reduction in the quantity, and also an alteration of the quality of the secretions of the conjunctiva can be observed. In the majority of instances anæmia, physical exhaustion, or other disturbances which depress the general health, are present, and to the local and general symptoms are added, failure of the accommodative power of the eyes and most annoying asthenopic symptoms. In those cases in which an optical error of the eyes co-exists, these symptoms appear in a most pronounced form and defy or effectually prevent all application of the eyes for close work. In the management of this variety of conjunctivitis, ordinarily so troublesome and tedious, hydrochlorate of hydrastine, in 1 and 2 per cent. and even stronger solutions, was found of particular advantage. The favorable influence exerted upon the progress of the disease, and also in modifying the annoying subjective symptoms, was probably assignable to the quick and decided stimulation of the vascular and secretory apparatus of the conjunctiva.

In chronic granular conjunctivitis, it was also found of benefit. In a large number of cases it was resorted to systematically during the second or stage of granular infiltration. In these cases daily applications of a stronger solution (5 per cent.) were made to the everted surfaces of the conjunctiva and immediately washed off with water. Both the use of weak collyria and the topical application of a stronger solution exerted a beneficial local and subjective influence, and effectually modified the protracted course of this most troublesome and chronic affection. In the transition or third stage of the disease, weaker solutions were used, and occasionally an application of a stronger solution. In the treatment of this extremely chronic and intractable affection it was not found to possess advantages over the customary remedies resorted to, and in several cases its use had to be discontinued, on account of the severe reaction and suffering which followed the application. In blepharitis marginalis it was applied in solution (2 per cent.) to the eroded and ulcerated margin of the lid. These cases progressed favorably and the improvement was assignable without doubt to the local stimulating effect of the remedy.

Reviewing briefly the advantages of this remedy in the management of the various diseases of the conjunctiva and its value as a therapeutic agent, it can be stated, that it is of principal advantage in catarrhal conjunctivitis, and especially in the chronic forms. It is of particular benefit in follicular conjunctivitis, and also an efficient remedy in granular conjunctivitis, blepharitis marginalis, etc. It appears to exert its specific local effect by exciting a temporary more or less pronounced hyperæmia of the conjunctiva, and, in consequence, active stimulation of its vascular and secretory structures. The action of hydrochlorate of hydrastine is prompt and decided.

In weak solutions it is a tonic to the mucous membrane; in stronger solutions a more or less pronounced irritant effect is added, and in still stronger solutions it is a powerful irritant. As a choice of remedy, it deserves attention and preference, in all the various affections of the conjunctiva attended by a disturbance of its functional activity, due to an acute, sub-acute or chronic process of inflammation. On account of its active stimulant properties, it modifies and aids in correcting the secretions and relieves in this way the annoying symptoms and almost invariable concomitants of catarrhal inflammations. It is, therefore, a valuable tonic, stimulant or irritant to the mucous membrane. In those cases where the remedy has not been the first choice it may prove a valuable substitute for other astringents or stimulants, which may have been unsuccessfully resorted to. In other cases it will prove a serviceable agent, occasionally resorted to in conjunction with other remedies.

Hydrochlorate of hydrastine is contra-indicated in all affections of the cornea or iris, either primary or occurring as complications in connection with or the result of conjunctivitis. It is also of no value, and, therefore, contra-indicated in all deep-seated affections of the eye. It is primarily and principally a tonic, stimulant or irritant to the mucous lining of the lids or conjunctiva, and its scope and efficiency of action is limited to functional or structural alterations of this important membrane.

In the ear, the use of solutions of hydrochlorate of hydrastine was also resorted to, but the number of observations was more limited. It was used, to modify or arrest irritating catarrhal and purulent discharges from the external auditory meatus, and its use was attended and followed by the same good, and in some instances even better results, than after instillations of the customary mineral astringents, or iodoform, boric acid, etc. In two cases of acute and five of chronic purulent otitis media the results were carefully noted. After thoroughly syringing the external auditory canal and middle ear, inflation by Politzer's method was practiced. This accomplished, the bottom of the meatus and those parts of the middle ear which were accessible through the perforation of the membrana tympani were carefully cleansed and dried, by means of absorbent cotton attached to a holder, and the powder applied to the eroded and exuberant mucous membrane. (In three out of the five cases this was an easy task, as the membrana tympani had been almost completely destroyed.) The results of systematic applications in these chronic cases were certainly favorable; in two of the five cases a marked reduction in the quantity and quality of the discharge occurred. All the cases had been under treatment and hydrochlorate of hydrastine solutions were substituted. All were apparently benefited; the discharge was reduced in quantity and lost its irritant and offensive characteristics. It can safely be said, that in many cases, carefully selected, the remedy is of advantage and deserves a trial either as a substitute or as a first choice. In several cases of granulations and polypoid formations, the result of otitis media purulenta, it was applied in substance, and, although it caused severe pain, it effected by systematic application a disappearance of the exuberant growths.

HYDRASTIS AND HYDRASTINE HYDROCHLORATE IN DISEASES OF THE SKIN.
—(Written for this publication by Dr. John V. Shoemaker, of the Jefferson Medical College of Philadelphia).—Hydrastis is a valuable drug in diseases of the skin, both internally and as a topical application. It is especially useful as a stomachic tonic, and as a hepatic stimulant in cutaneous affections depending upon gastro-intestinal disorders.

It is best administered in the form of the fluid extract of hydrastis which Prof. Roberts Bartholow has shown to contain all the constituents of the drug and is the preferable preparation to use. In *seborrhœa-sicca* or *oleosa*, which frequently develops from some alimentary trouble, the scaly, reddened or greasy state of the skin may lessen or disappear by the use of ten or twenty drops of the fluid extract of hydrastis three times daily. The red or white of papules black points or pustules of acne or the enlargement of the blood vessels and tissue of *acne-rosacea* due to the same cause may alone be relieved or cured by the internal administration of hydrastis. It is an excellent remedy to use in scrofulous diseases of the skin, in patients having feeble digestion, loss of flesh and enlarged glands, with or without unhealthy ulcers. In cases of this nature it will stimulate the appetite, lessen the involvement of the skin and assist the action of local medication in removing the disease. It has also acted in a happy manner upon some cases of lupus, sycosis, boils, carbuncles and ulcers, on which the local condition was largely due to a lack of nutrition of the system. Eczema which is so often depending upon debility or some gastro-intestinal disorder, may at times be greatly relieved or cured by free doses of the fluid extract of hydrastis.

Children suffering with the pustular form of this disease, known as *eczema impetiginodes* or milk crust, small doses of the fluid extract from one to five drops in mucilage or glycerine three times daily increases the digestive power, lessens the formation of pus, and has a powerful tonic action upon the previously enfeebled system. In broken down syphilitic subjects, especially in those in whom the alimentary canal is weak and irritable, often from alcoholic excess, or from the use of too much mercury or one of the iodides, the use of hydrastis is attended with most marked and beneficial results.

Hydrastis may be employed alone internally or in some cases its conjoined internal and external use will at times be found most efficacious. The range of usefulness, however, as a topical application, is even greater than from its internal administration. The fluid extract, which is the preparation generally employed for local use, has both a stimulant and an astringent action on the integument which is well marked when the skin is denuded or inflamed. It may be used undiluted, or what is even better, diluted one-half or one-third with water, oil, mucilage, or glycerine. Inflammatory affections of the mucous membrane, especially stomatitis, syphilitic lesions, and eczema are greatly benefited or even at times removed by the application of the fluid extract of hydrastis. The fissured form of the latter diseases which occurs around the

mucous outlets, as on the lips and about the anus, or on the flexor surfaces and between the fingers and toes are sometimes rapidly improved by its use. It also exerts a most efficacious action or lessens the inflammation and thickening in chronic eczema, whether involving the parts just referred to or other regions. Abrasions, sinuses, ulcers and granulations are greatly improved by the application of this remedy.

While the use of the fluid extract of hydrastis has been attended with much benefit in many of the diseases just cited yet its employment has been open to a very great objection from the staining which follows everything with which it comes in contact. This staining power which is usually imparted to the clothes of patients, is not easily removed even by washing and the unpleasant effect that follows the employment of this drug would almost entirely preclude its adoption in private practice, when so many other, elegant, cleanly and efficacious preparations are now constantly on hand for use. Fortunately, however, the objection referred to has been entirely overcome by the recent investigations of Prof. Bartholow, who has demonstrated the active principle of the drug hydrastine, which can be combined to form hydrastine hydrochlorate, which has all the physiological effect of the former drug. Further, the salt so formed not only possesses all the good qualities for cutaneous application, claimed for hydrastis, but it is also perfectly free from the staining qualities of the latter drug.

Hydrastine Hydrochlorate.—This salt occurs as a fine white powder slightly tinged with yellow, inodorous but very bitter and soluble in water, alcohol, oils and fats. Its color, its odorless character, and its great solubility furnishes a remedy of unusual advantage for topical application in diseases of the skin.

During a short experience with this preparation I have found it most useful mixed with water, alcohol or fat in hyperiodrosis, seborrhœa, acne, eczema and in ulcers. Thus from five to twenty grains of hydrastine hydrochlorate to the ounce of alcohol, has a most beneficial effect on excessive secretion which may occur in the axillary or inguinal regions, or on the palmar and plantar surfaces. This same combination acts well in seborrhœa-sicca, especially of the scalp, attended with loss of hair, the stimulant and astringent action of the solution lessening or relieving the irritability of the follicles and glands of the part. The papules and black spots of acne yield sometimes very rapid to the application of the alcoholic solution of hydrastine hydrochlorate. Acne rosacea and seborrhœa oleosa or the greasy state of the skin so often seen in the face of young women have in several instances improved much on an application of an aqueous solution of this drug, or a mixture of the salts with a fatty substance in the proportion of from five to twenty grains to the ounce.

The ointment of hydrastine hydrochlorate, the salt being incorporated in the fat in from ten to sixty grains to the ounce, has proved a most excellent application in some cases of subacute and chronic eczema; the thickened and irritable state of the skin in the latter condition subsiding at times very rapidly

on its application. It has also been serviceable in some scrofulous and varicose ulcers used in the form of an ointment. The good results so far realized from the topical application of hydrastine hydrochlorate may be illustrated by the following cases in which it has been employed in the clinical service of the Philadelphia Hospital for Skin Diseases.

Acne.—Robert T. æt 17. Forehead, cheeks and chin covered with small red papules associated with black points—acne punctata—and papulo-pustules, digestion feeble, bowels torpid. Ten drop doses of the fluid extract of hydrastis were given three times daily before meals and the face was sponged night and morning with an aqueous solution of hydrastine hydrochlorate containing ten grains of the salt to the ounce. In ten days the patient showed signs of improvement, and in six weeks after being placed under treatment he was discharged cured.

Eczema of the Face.—Anna B. æt 3. Scalp and face covered with thick crusts, which upon removal exposed red raw and infiltrated patches, digestion poor, constipation at times followed with diarrhoea. Half a drop increased to a drop of the fluid extract of hydrastis was administered in milk three times daily with the effect, in course of twelve days, of improving the child's general condition and lessening somewhat the local inflammation. The red and infiltrated patches still remained stubborn, notwithstanding the use of the ordinary ointments. At the end of the second week of the constitutional treatment, one ounce of lard with twenty grains of hydrastine hydrochlorate was used freely over the parts. The red and thickened patches gradually disappeared and in two weeks time from the beginning of the topical application only a slightly desquamating surface remained.

Eczema of the Anus.—James T. æt 32. Had been under treatment at various times with only temporary relief. The margins around the anus was thickened and fissured, many of which extended well into the mucous membrane of the parts. No apparent exciting cause could be detected. The application of the ointment of hydrastine hydrochlorate twenty grains of the salt to the ounce being employed was followed by relief within a few days. Several weeks have now passed and the patient having failed to report has doubtless obtained permanent relief.

Eczema of the Ears.—Mary W. æt 27. The right and left ears were red, somewhat thickened and covered with scales. The skin back of each pinna was in a similar condition with several fissures at their connection with the side of the head. The inflammation of the ears had originally been excited by a dye, and had resisted the usual local remedies. The ointment of hydrastine hydrochlorate, of the same strength as mentioned in the previous case, was used with good effect within six days. The ears in about three weeks had acquired their natural size. The fissures healed quickly, and when last seen, about ten days ago, only a little roughness of the integument was apparent.

Eczema of the Feet.—Mrs. G. æt 36. The dorsal surface of both feet were red, slightly infiltrated, especially about the toes, between which were some well marked fissures. The disease had been in existence for some time and had been caused by using some remedy to remove corns from the feet. At first, a five, and afterward, a ten per cent. ointment of hydrastine hydrochlorate was used which completely removed the disease in from five to six weeks time.

Seborrhœa Sicca of the Scalp.—Wm. S. æt 22. The scalp was caked over with a thick sebaceous secretion, the hair being dry and lustreless. The disease had followed after typhoid fever, the patient at the time of examination was weak and poorly nourished. Cod liver oil in large doses soon improved the systemic condition, but the local trouble continued the same. The parts were sponged once daily with an alcoholic solution of hydrastine hydrochlorate, thirty grains of the salt being employed to the ounce with the effect of removing within eight or ten days all the crusts and scales, and after some three weeks topical application but a slight evidence of the disease existed.

Inflammation of the hair follicles of the Beard.—Thomas R. æt 24. The upper lip was the seat of many pustules and papules, especially around the margin of the anterior nares. Two grain doses of the iron iodide was administered and a ten per cent. hydrastine hydrochlorate ointment applied to the parts, brought relief within six or eight days, the patient then disappeared and has not since reported.

Seborrhœa Oleosa.—Maggie C. æt 19. Forehead, cheeks and nose slightly red and very greasy.

Many of the follicles of the parts were plugged with comedones, and the skin in patches presented even a dirty hue. A uterine cause which excited the disease had been removed by one of the physicians at a general hospital, but the local condition, although lessened by the previous treatment, continued annoying. An aqueous solution of first five and afterward twenty grains of hydrastine hydrochlorate to the ounce lessened the poured out oily fluid and improved decidedly the deformity of the skin in about two weeks time. Patient has since ceased her visits to the hospital and perhaps has concluded she is now cured.

Hyperidrosis.—Mrs. L. æt 39. Applied for the relief of excessive sweating from the arm pits, which had been very annoying for some time. Health good and local trouble could not be traced to any constitutional cause. The frequent use of an aqueous solution containing thirty grains of hydrastine hydrochlorate to the ounce proved an effective application within a few weeks time.

Ulcers.—Carrie H. æt 13. Had two small ulcers, one on the right and the other on the left side beneath the inferior maxillary from broken down lymphatic glands. The floor and margins of the ulcers were covered with indolent granulations and with an unhealthy and scanty pus. Constitutional treatment improved without removing the ulcers. A ten increased to a twenty per cent. hydrastine hydrochlorate ointment healed them completely in a little over one month's time.

Hydrastine hydrochlorate from the cases just cited and others now improving under its use will no doubt prove a valuable topical application, especially in diseases of the skin. Its stimulant and astringent properties may make it available, not only in the affections alluded to, but also in many others. From present experience it is better adapted for use in diseases in which the inflammation is not too active, more particularly in the subacute and chronic stages. Precautions should be exercised in using it, on an acute eruption and if employed the solution or ointment should be very weak otherwise the active stimulant and astringent effect of the salt may increase instead of diminish the disease. It is better and much more effective even in those diseases in which it is indicated not to use too strong a solution or ointment in beginning the application to the skin.

ACTION OF HYDRASTINE HYDROCHLORATE ON THE GENITO-URINARY MUCOUS MEMBRANES—(Written for this publication by Prof. F. W. LANGDON, M. D., of the Miami Medical College of Cincinnati).—Prominent amongst the features which have characterized the progress of modern medicine are those improvements in pharmaceutical chemistry whereby we are enabled to obtain, in concentrated form, the active principles of various vegetable remedies, such as morphine, atropine, quinine, strychnine, piperine, theine, cocaine, etc. We have another instance of this dominion of mind over matter in the preparation which forms the subject of the present observations, viz: The Hydrochlorate of Hydrastine, prepared from the white alkaloid of the well-known plant, *Hydrastis canadensis*.

At the request of the Messrs. Lloyd, I have instituted a series of clinical experiments with this preparation, somewhat limited as regards time and number, but sufficient to demonstrate the fact that the drug in this form possesses the power of influencing favorably certain morbid conditions of the secreting structures of the male urethra. I have used the drug, as an injection only, in the strength of one-half grain to three grains to the ounce of distilled water.

To sum up, briefly, the results of this series of observations, we may classify the cases under three heads, namely:

1.—Acute Gonorrhœa. Here the use of an injection containing one to two grains to the ounce, *after* the subsidence of the first acute symptoms, swelling, pain, etc., arrested the discharge in a few days in several cases. This, however, as is well known, is so common a result of the use of many other remedies (and even, at times, occurs spontaneously, if patients are to be believed) that its significance may readily be overestimated. The fact, however, that it has been uniformly successful in even a small number of cases (six) is worthy of note.

2.—Gleet dependent on stricture or localized ulceration. Here, as might be expected, its use was attended by unsatisfactory results, as would be any measures short of treating the actual lesion. While a slight improvement seemed to follow its use in some of these cases, in others it exerted a decidedly irritant action, even in the strength of one grain to the ounce.

3.—Gleet dependent on a relaxed condition of the urethral mucous membrane purely functional; the discharge a mere weeping, almost watery in character—a *true catarrh*, in fact. It is in these cases that the drug seems to exert a most favorable influence, producing immediate improvement and final cure in troublesome cases which had resisted the variety of men and measures to which they are usually subjected. Its use, however, requires caution as regards the strength of solution. While an injection of two to three grains to the ounce of distilled water produces the best results in some, others manifest an immediate increase of irritation and discharge upon using even a one-grain solution; so that, to begin with, a half-grain solution is sufficient for most cases, to be gradually increased according to indications.

The drug certainly deserves further attention at the hands of the profession.

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- 1871.—*Journal of Materia Medica*, Bates & Tilden, p. 146. Hydrastis and Berberine.
- 1872.—*Supplement to Journal of Materia Medica*, Tilden & Co., p. 51. Hydrastis.
- 1873.—*Eclectic Medical Journal*, Cincinnati, p. 573. Phosphate of Berberine.
- 1873.—*Druggists' Circular and Chemical Gazette*, p. 73. Hydrastis, Berberine, Hydrastine.
- 1873.—*Proceedings American Pharmaceutical Association*, p. 232. Third Alkaloid.
- 1873.—*American Journal of Pharmacy*, p. 247. Third Alkaloid.
- 1873.—*New Remedies*, New York, p. 431. Hydrastis, Hydrastine, Berberine; p. 524, Third Alkaloid.

- 1873.—Dictionary of Pharmaceutical Science, Sweringen, pp. 216 and 217. Hydrastis, Berberine, and Hydrastine.
- 1874.—Treatise on Pharmacy, Parish, 4th edition (and other editions), pp. 474, 479, 480, 754, Berberine; p. 474, Hydrastis; p. 754, Hydrastine.
- 1875.—Pharmaceutical Journal and Transactions, London, p. 467. Third Alkaloid.
- 1875.—New Remedies, Wm. Wood & Co., N. Y., p. 20. Berberine.
- 1875.—Druggists' Circular, p. 159, Hydrastine.
- 1875.—Journal of Materia Medica, Bates & Tilden, p. 56. Berberine.
- 1875.—Proceedings of American Pharmaceutical Association, p. 426. Test for Berberine.
- 1875.—American Journal of Pharmacy, pp. 480, 574. Third Alkaloid of Hydrastis.
- 1876.—American Journal of Pharmacy, p. 226, Hydrastis; p. 386, Berberine and Hydrastine.
- 1876.—The Journal of Materia Medica, Bates & Tilden, p. 122, Berberine; p. 293, Hydrastis.
- 1877.—American Pharmaceutical Association, pp. 156, 405. Third Alkaloid, Berberine and Hydrastine.
- 1877.—American Pharmaceutical Association, p. 97. Third Alkaloid Berberine and Hydrastine.
- 1877.—American Journal of Pharmacy, p. 339, Hypophosphite of Berberine; p. 472, Phosphate of Berberine.
- 1877.—New Remedies, Wm. Wood & Co., p. 238. Hypophosphite of Berberine.
- 1877.—Materia Medica and Therapeutics, Goss, pp. 87, 347, 88. Berberine Sulphate and Muriate.
- 1877.—The Pocket Formulary, Beasley, p. 187. Berberine.
- 1877.—Pharmaceutical Journal and Transactions, London, p. 87, Hypophosphite of Berberine; p. 567, Phosphate of Berberine.
- 1878.—Organic Constituents of Plants, Wittstein (Von Mueller), p. 26. Hydrastis and Berberine.
- 1878.—Pharmaceutical Journal and Transactions, London, p. 567. Phosphate of Berberine.
- 1878.—Proceedings American Pharmaceutical Association, p. 599, Hypophosphite of Berberine; p. 800, Salts of Berberine, Oil and Resin of Hydrastis, Berberine and Hydrastine.
- 1878.—American Journal of Pharmacy, p. 470. Berberine, Hydrastine, Third Alkaloid.
- 1878.—The United States Homœopathic Pharmacopœia. Hydrastis.
- 1878.—New Remedies, Wm. Wood & Co., New York, p. 226, Phosphate of Berberine; p. 361, Berberine and Hydrastine.
- 1878.—Dispensatory and Pharmacopœia of North America and Great Britain, p. 175; Berberine, p. 176.
- 1879.—National Dispensatory, p. 729 (and subsequent editions). Hydrastis, Berberine, Hydrastine, Third Alkaloid.
- 1879.—Pharmaceutical Journal and Transactions, London, p. 897. Phosphate of Berberine.
- 1879.—Proceedings American Pharmaceutical Association, p. 196.
- 1879.—Eclectic Medical Journal, Cincinnati, p. 174. Hydrastine.
- 1879.—New Remedies, Wm. Wood & Co., p. 19.
- 1879.—Students' Pocket Medical Lexicon, Longley, p. 38, Berberine; p. 137, Hydrastine and Hydrastis.
- 1879.—Pharmaceutical Journal and Transactions, London, p. 125, Berberine and Hydrastine; p. 163, Berberine.
- 1880.—New Remedies, Wm. Wood & Co., p. 375.
- 1880.—Preliminary Report on Revision of U. S. Pharmacopœia, p. 51.
- 1880 and 1881.—British Medical Journal.
- 1881.—New Remedies, Wm. Wood & Co., p. 183, Hydrastis and Berberine.
- 1881.—Medical Formulary, Laurence Johnson, pp. 220, 221, Hydrastis; pp. 221, 222, Berberine Muriate and Sulphate; p. 221, Hydrastine.
- 1881.—Lancet and Clinic.
- 1881.—American Journal of Pharmacy, p. 138. Berberine and Hydrastine.
- 1881.—Proceedings American Pharmaceutical Association, p. 345. Hydrastine and Berberine.
- 1882.—United States Pharmacopœia, sixth revision, pp. 181, 125.
- 1882.—American Pharmacist, p. 290.
- 1882.—Pharmacopœia of the United States, p. 181.
- 1882.—Pharmaceutical Journal and Transactions, p. 318. Berberine and Thymol.
- 1882.—American Practice of Medicine, Goss, pp. 69, 148, 153, 158, 182, 203, 216, 243, 249, 495, 572, 579, 596. Hydrastis and Berberine Salts.
- 1882.—Dictionary of Economic Plants, Smith, London, p. 446. Hydrastis.
- 1882.—Druggists' Circular, p. 51.
- 1884.—Companion to the Pharmacopœia, Oldberg and Wall, p. 579. Hydrastis, Berberine, and Third Alkaloid.
- 1884.—Plant Analysis, Dragendorff, pp. 49, 62, 258. Berberine.
- 1884.—Materia Medica and Therapeutics, Roberts Bartholow, p. 165 (and other editions). Hydrastis and Alkaloids.

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- 1759.—*Warneria canadensis*.—Miller, Description of the figures of plants adapted to the Gardener's Dictionary, p. 130. Illustrated with a good plate of the flowering and fruiting plant.
- 1762.—*Hydrastis Canadensis*.—Linnaeus, Species Plantarum, 2d edition, Vol. I., p. 784; 3d edition, 1764, Vol. I., p. 784.
- 1789.—*Hydrastis canadensis*.—Aiton, Hortus Kewensis, 1st edition, Vol. II., p. 273; 2d edition, 1811, Vol. III., p. 362.
- 1789.—*Hydrastis canadensis*, Linn.—Lamarck, Encyclopédie méthodique Botanique, Vol. III., p. 151.
- 1799.—*Hydrastis canadensis*.—Willdenow, Species Plantarum of Linnaeus, 4th edition, Vol. II., Part II., p. 1339.
- 1803.—*Hydrastis Canadensis*.—Michaux, Flora Boreali-Americana, Vol. I., p. 317.
- 1805.—*Hydrastis canadensis* Linn.—St. Hilaire, Exposition des Familles Naturelles, Vol. I., p. 486.

* In making these references, care has been taken to capitalize the specific name only when capitalized in the original work. A dash after the name indicates that no authority is given for it.

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- 1807.—*Hydrastis canadensis* —.—Persoon, *Synopsis Plantarum*, Vol. II., p. 107.
 1814.—*Hydrastis canadensis* —.—Pursh, *Flora Americæ Septentrionalis*, Vol. II., p. 389.
 1815.—*Hydrastis Canadensis* *Linn.*—Barton, *Floræ Philadelphicæ prodromus*, p. 61.
 1817.—*Hydrastis canadensis* —.—Faton, *Manual of Botany of Northern and Middle States*, 1st edition, p. —; 2d edition, 1818, p. 276; 3d edition, 1822, p. 210; 4th edition, 1824, p. 325; 5th edition, 1829, p. 248; 6th edition, 1833, Part II., p. 179; 7th edition, 1836, p. —.
 1818.—*Hydrastis canadensis* —.—De Candolle, *Systema Naturale Regni Vegetabilis*, Vol. I., p. 218.
 1818.—*Hydrastis Canadensis* —.—Nuttall, *Genera of North American Plants*, Vol. II., p. 21.
 1818.—*Hydrastis Canadensis* *Linn.*—Barton, *Vegetable Materia Medica of the United States*, Vol. II., p. 17. Illustrated with a good colored engraving of the Plant (inaccurately showing, however, an expanded flower *with sepals*); also with the outline of a mature leaf and parts of the flower.
 1818.—*Hydrastis Canadensis* —.—Muehlenberg, *Catalogue Plants Americæ Septentrionalis*, 2d edition, p. 57.
 1818.—*Hydrastis Canadensis* —.—Barton, *Compendium Floræ Philadelphicæ*, Vol. II., p. 22.
 1824.—*Hydrastis canadensis* *Linn.*—De Candolle, *Prodromus Systematis Naturalis*, Vol. I., p. 23.
 1824.—*Hydrastis Canadensis* *Linn.*—Elliott, *Sketch of the Botany of South Carolina and Georgia*, Vol. II., p. 55.
 1825.—*Hydrastis canadensis* *Linn.*—Rees, *Cyclopædia*, Vol. XIX. (date doubtful, work not paged or dated).
 1826.—*Hydrastis canadensis* —.—Torrey, *Compendium of the Flora of Northern and Middle States*, p. 224.
 1828.—*Hydrastis Canadensis* —.—Rafinesque, *Medical Flora of North America*, Vol. I., p. 251. Illustrated with a plate (No. 51) of the flowering plant (flowers inaccurate).
 1830.—*Hydrastis canadensis* *Linn.*—Hooker, *Botanical Magazine*, Vol. LVII. (Vol. IV., new series), No. 3019. Illustrated with a good colored plate showing a flowering plant and dissections of the flower.
 1831.—*Hydrastis Canadensis* *Linn.*—Don, *Dichlamydeous Plants*, Vol. I., p. 22. Illustrated with a small, inaccurate cut (fig. 7) of plant and fruit.
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 1833.—*Hydrastis canadensis* *Linn.*—Beck, *Plants of the Northern and Middle States*, p. 7.
 1837.—*Hydrastis Canadensis* *Linn.*—Darlington, *Flora Cestrica*, 2d edition, p. 336; 3d edition, 1853, Part II., p. 7.
 1838.—*Hydrastis canadensis* *Linn.*—Torrey and Gray, *Flora of North America*, Vol. I., p. 40.
 1838.—*Hydrastis canadensis* *Linn.*—Lindley, *Flora Medica*, p. 3.
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 1840.—*Hydrastis canadensis* —.—Eaton and Wright, *North American Botany*, p. 276.
 1843.—*Hydrastis Canadensis* *Linn.*—Torrey, *Flora of the State of New York*, Vol. I., p. 26.
 1843.—*Hydrastis canadensis* *Linn.*—Dietrich, *Synopsis Plantarum*, Vol. III., p. 338.
 1845.—*Hydrastis Canadensis* —.—Wood, *Class-Book of Botany*, 1st edition, Part II., p. 21; 2d edition, 1847, p. 148; 3d edition, 18—, p. 212.
 1848.—*Hydrastis Canadensis* *Linn.*—Gray, *Manual of Botany of the Northern United States*, 1st edition, p. 15; 2d edition, 1856, p. 14; same, 3d and 4th editions; 5th edition, 1867, p. 47.
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 1849.—*Hydrastis canadensis* —.—Strong, *American Flora*, Vol. III., p. 174. Illustrated with a colored plate of the fruiting plant, good except the root, which is inaccurate.
 1860.—*Hydrastis Canadensis* *Linn.*—Chapman, *Flora of the Southern United States*, p. 11.
 1866.—*Hydrastis Canadensis* *Linn.*—Baillon, *Histoire des plantes*, Vol. I., p. 87. Illustrated with a longitudinal section of the carpel (fig. 85—(English translation by Hartog, 1871, Vol. I., p. 49).
 1866.—*Hydrastis canadensis* *Linn.*—Darby, *Botany of the Southern States*, p. 210.
 1869.—*Hydrastis Canadensis* *Linn.*—Lawson, *Ranunculaceæ of the Dominion of Canada*, p. 51.
 1870.—*Hydrastis Canadensis* *Linn.*—Wood, *The American Botanist and Florist*, p. 23.
 1880.—*Hydrastis canadensis* *Linn.*—Bentley and Trimen, *Medicinal Plants*, Vol. I., No. 1. Illustrated with a good colored plate (No. 1) of a flowering plant and parts of flower and fruit, also outline of mature leaf.
 1884.—*Hydrastis Canadensis* *Linn.*—Millsbaugh, *American Medicinal Plants*, No. 9. Illustrated with a colored lithographic plate of the plant.

BULLETIN
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of
BOTANY, PHARMACY AND
MATERIA MEDICA

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The Indian Doctor's Dispensary, being Father Smith's Advice respecting Diseases and their cure, by Peter Smith of the Miami County. Cincinnati, printed by Brewster & Looker for the Author, 1812, with Biography by John Uri Lloyd.

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The Genera of Gymnomyces. Illustrated with 40 Figures. By C. G. Lloyd.

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Reminiscences to Capillary to the end of the year 1899. Being Chapter VII of "A Study in Pharmacy." By John Uri Lloyd, Pharm. M. The references collected and abstracted under the auspices of John Uri Lloyd, Esq. August Wadsworth, Ph. D., Librarian of the Lloyd Library.

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The Gasterales. Illustrated with 20 Figures. By C. G. Lloyd.

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Materia Medica Americana. Potissimum Regni Vegetabilis. Eryngias, Samoliferae, Iac. Palmis, MDCCLXXVII. By Johannes David Schimper.

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An Account of some of the vegetable Productions, naturally growing in this part of America historically arranged. By the Rev. Manners Sutton, F. A. S. and M. S. and member of the Philosophical Society at Philadelphia.

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The Lycopodiaceae of Australia, New Zealand and Neighboring Islands. Illustrated with 27 Plates and 20 Figures. By C. G. Lloyd.

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An investigation of the Properties of the Sanguinaria Canadensis; or Puccoon By William Dorrance, of Maryland. Member of the American Linnean and Philadelphia Medical Societies.

Travels Through the Interior Parts of North America in the Years 1756, 1757 and 1758. By J. Carver, Esq., Captain of a company of provincial troops during the late war with France. Illustrated with copper plates. London. Printed for the Author, and sold by J. Walter, at Charing-cross, and St. Crowder, in Peter street Lane. MDCCLXXVIII.

Libellus De Usu Medicorum Plantarum Nigris. By Antonius Storck. MDCCCLXI.

BULLETIN No. 10. REPRODUCTION SERIES, No. 6. ERYNGIIS CANADENSIS.

A review with illustrations of the analysis of Drugs and Medicines of North America. 1881.

BULLETIN No. 11. REPRODUCTION SERIES, No. 7.

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1960



SAM^L. THOMSON - BOTANIST.

His System and practice originating with himself
Born Feb'y 9th 1769.

[From "The Thomsonian Materia Medica," 1841.]

EDITOR'S INTRODUCTION

SAMUEL THOMSON. In presenting this Bulletin of the Lloyd Library, the editor finds it necessary to deviate from the methods adopted in the publications heretofore offered in our Reproduction Series. In the preceding issues, the aim has been to present *fac similes* of each work, even to the copying of gross errors, and the imitation, as far as possible, of both the type and the manuscript form of the publication. In the present Bulletin such a method is impossible, owing both to the extent and cosmopolitan nature of the publication we are presenting, and to the fact that our aim is to portray the MAN, and picture conditions of that period, rather than to present in full any one or more of his works. In our opinion, a comprehension of this remarkable man can be accomplished only by bringing the reader into touch with conspicuous phases of his life and examples of his methods, as well as by a realization of his ideals, as shown by the efforts and the sacrifices he made, in the face of the most pronounced resistance to his processes. This we aim to do in the pages that follow.

In our opinion, this Bulletin will give to the reader a fair picture not only of the man before us, but also of the conditions that, at the time mentioned, dominated the disciples of the healing art in America. To this we may add that one can not now easily enter into the problems of that day concerning medicine and the practice of medicine. The passion, the dogmatism, the vituperation of the period, the suppression of free thought and investigation outside authority, is a something that can not now be expressed or readily appreciated. But a touch of it all can be grasped and partly comprehended by noting the evolution that has taken place in the fields of American pharmacy and medicine since the beginning of the last century; by contrasting present conditions with the period typified in the record of Samuel Thomson.

The *New Guide to Health*, whose title-page is given in *fac simile*, was first issued by Samuel Thomson in 1822. It passed rapidly through many editions, some of them exceedingly large, but with few changes other than supplements, as shown in the Additions, reproduced by us, pages 50-54.

EDITOR'S INTRODUCTION

That 1835, one-volume edition, in small type set solid, comprised both the *Narrative*, 228 pages, and the *Guide to Health*, the latter consisting of a description of diseases and their treatment, 168 pages. The latter section, which was in the outset Thomson's *Materia Medica* and methods of practice, was afterwards issued in more pretentious form as *Thomson's Materia Medica or Botanic Family Physician*. It carried a discursive introduction, a work on anatomy, a section on materia medica, and one on botany, as well as one on the theory and practice of medicine according to the Thomsonian methods. A number of editions of this work were issued by Thomson and his agents, until in 1841 appeared the unabridged *Thirteenth Edition*, issued by his son, John Thomson, the elaboration of which, however, did not altogether meet the approval of the original author. Hence we find, page 831 of the 1841 edition, an editorial note by John Thomson, illustrating the manner in which his father insists upon the work being accompanied by the following qualified statement, in order to show his disapproval of the innovations named.

"IMPORTANT NOTICE."

"The following objections to the different articles and compounds in this book, were made by Dr. Samuel Thomson, after the work was printed. And in justice to him, and out of respect to his opinion, we insert them here, that every one may know that his opinion is not changed in relation to cathartics, and that what is said upon that subject is done on our own responsibility, and for which Dr. Thomson is not to be held responsible. The following are the objections, viz.

All cathartic medicine, of every kind; also, the compounding of the black salve, on page 734 (for which we have inserted a substitute on page 823); borax for sore mouth, page 738; maple charcoal to prevent mortification, on page 727; a paper saturated with salt petre, and burned, to relieve asthma, page 742; Peruvian bark to clean the teeth, page 740; poke root made into ointment for the piles, page 741; sulphate of zinc compounded into poultices for syphilitic ulcers, page 733; burnt alum for dysentery, page 726; tobacco emetic pills, page 700; asafetida for hysteria, page 634; blood root for emetic, page 684; black cohosh to cure rheumatism, and to regulate the monthly turns with females, page 643; and, page 695, the injection should be given before steaming.

It is to be understood, that he objects to the use of those articles, in every form or shape whatever, except the enemas."

JOHN THOMSON.

(Thomson's *Materia Medica or Botanic Family Physician*, 1841.)

In our reproduction of the text of the *New Guide to Health*, as given in this Bulletin, pages 3 to 64, no change has been made in statement or in text, other than in editorially excising, in blocks, more or less material unnecessary to the presentation of Samuel Thomson's life, as written by himself. These excluded fragments are usually accounts of special cases illustrating his methods, or disconnected digressions which

EDITOR'S INTRODUCTION

may be omitted without in any wise affecting the continuity of the work. In some instances the excluded portions comprise not more than half a page, while in other cases several successive pages are excised. Had the entire text been reproduced, our Bulletin would have been fully twice its present size; but we take it, all the important features concerning the events in Thomson's life, as he has recorded them, are connectedly presented. To this we will add that the *headings of the paragraphs* are all our own.*

One feature in Thomson's life is absolutely ignored in his writings, nor is it, so far as we know, elsewhere recorded. On page 51 of this Bulletin is to be found an intimation by him that he was involved by Mr. Locke in the famous Morgan Masonic controversy, then raging in New York. This leads us to state that a share, and possibly no small proportion, of Thomson's troubles, came also from his pronounced political activity, at a time when in American politics no toleration whatever was exhibited by one party for an adherent of the opposite political faith. We have it in a letter from the late Alexander Wilder, M. D., to ourselves personally, that Thomson's allegiance to the minority party of that date led to much of his persecution, a fact that Thomson utterly ignores in any print that we have seen from his pen.

On page 50 and following, of this Bulletin, subsequent to the *Narrative and Guide*, we introduce the Additions made to that publication in the 1825 edition, and on page 51 the Additions made in 1831, both of which, in connection with the life history of Samuel Thomson, are of exceeding interest. On page 54 we reproduce a *Notice*, by which he authorized agents to sell his patented rights to the *Botanical System of Practice in Medicine*, and another from an authorized agent, announcing the right to practice by that authority. Following these are a couple of characteristic reproductions (pages 54, 55) showing the turn of Thomson's mind for philosophizing over incidents.

Pages 56 to 64 present the letters of Professor Benjamin Waterhouse, M. D., to whom the 1841 edition of Thomson's *Materia Medica* is dedicated, these being also published in the 1835 edition of Thomson's *Guide to Health*. The comments upon these letters, pages 63, 64, are written by the editor of this Bulletin.

Page 65 is a reproduction of the title-page of a pamphlet concerning the celebrated Trial of Dr. Frost, from which enough is taken, pages 67-74, to make a lucid account, illustrating the manner in which Thomson's disciples were handled at that time. The introduction to this section,

* "*Concentrated Principles*" (now in process) will, we hope, soon be issued as a companion Bulletin to this one. In this, the history of the evolution of Thomsonism and Eclecticism is continued and amplified.

EDITOR'S INTRODUCTION

page 67, is also from our pen, as well as are the remarks concerning lobelia, page 73, and the closing paragraph, page 74.

Pages 75-77 give a list of the authorized Thomsonian remedies, together with an introduction to same (page 75) by ourselves. Following, on page 78, is to be found the advertisement of Dr. John Rose, Editor of the *Lobelia Advocate*, 1838, as well as an advertisement of the Botanico-Medical College, Cincinnati, Ohio, 1844. Following these, 79-85, come verbatim reproductions of directions for taking the Thomsonian Courses of Medicine. Here we offer a few editorial remarks, and have added (page 85) the remedies recognized under Thomson's famous numbers, 1 to 6.

In pages 86-89, Nathaniel S. Magoon, of Boston, in whose house Thomson spent his last days, describes the death of this remarkable man.

We have, in our opinion, made a collaborated record, presenting succinctly to the readers of this Bulletin the life of the man who, in one way or another, exerted a tremendous influence on the American practice of medicine. In this may be included the efforts of antagonists who but for Thomson would not have become conspicuous, or even known, as well as of reformers, to whom Thomson's aggressive methods and Thomson's suggestions proved a stimulus. Out of it all came the kindlier theories that have largely succeeded the heroic age, an era of barbarism, in American medicine. And, in our opinion, one and all at the present time can, in charity for all who were involved at that day, and without bitterness towards any one, review this story of the past, crediting those to whom credit is due.

JOHN URI LLOYD.

NEW
GUIDE TO HEALTH;
OR
Botanic Family Physician.

CONTAINING
A COMPLETE SYSTEM OF PRACTICE,
ON A PLAN ENTIRELY NEW:
WITH A DESCRIPTION OF THE VEGETABLES MADE USE OF,
AND DIRECTIONS FOR PREPARING AND ADMIN-
ISTERING THEM, TO CURE DISEASE.

TO WHICH IS PREFIXED,
A NARRATIVE
OF THE
LIFE AND MEDICAL DISCOVERIES
OF THE AUTHOR.

BY SAMUEL THOMSON.

BOSTON:
Printed for the Author, and sold by his General Agent, at
the Office of the Boston Investigator.
J. Q. ADAMS, Printer.
1835.

[Entered according to Act of Congress, in the year
1835, by SAMUEL THOMSON, in the Clerk's Office
of the District Court of Massachusetts.]

ADVERTISEMENT

TO THE PUBLIC

THE preparing of the following work for the press, has been a task of much difficulty and labor, for to comprise in a short compass, and to convey a correct understanding of the subject, from such a mass of materials as I have been enabled to collect, by thirty years' practice, is a business of no small magnitude. The plan that has been adopted I thought the best to give a correct knowledge of my system of practice; and am confident that the descriptions and directions are sufficiently explained to be understood by all those who take an interest in this important subject. Much more might have been written; but the main object has been to confine it to the practice, and nothing more is stated of the theory than what was necessary to give a general knowledge of the system. If any errors should be discovered, it is hoped that they will be viewed with candor; for in first publishing a work, such things are to be expected; but much care has been taken that there should be no error, which would cause any mistake in the practice, or preparing the medicine.

Many persons are practising by my system, who are in the habit of pretending that they have made great improvements, and in some instances it is well-known that poisonous drugs have been made use of under the name of my medicine, which has counteracted its operation, and thereby tended to destroy the confidence of the public in my system of practice; this has never been authorized by me. The public are therefore cautioned against such conduct, and all those who are well disposed toward my system, are desired to lend their aid in exposing all such dishonest practices, in order that justice may be done. Those who possess this work, may, by examining it, be able to detect any improper deviations therefrom; and they are assured that any practice which is not conformable to the directions given, and does not agree with the principles herein laid down, is unauthorized by me.

[The above is the preface to Thomson's original edition, 1822.—L.]

“NARRATIVE

OF THE

LIFE, &c., OF SAMUEL THOMSON”*

Childhood of Samuel Thomson.

THERE is nothing, perhaps, more unpleasant than to write one's own life; for in doing it we are obliged to pass over again, as it were, many scenes, which we might wish to have forgotten, and relate many particulars, which, though they may seem very important to ourselves, yet would be very uninteresting to the reader. It is not my intention to attempt to write a history of my life, nor would it be in my power to do it if I had such a wish; but as I have been the greater part of my life engaged in one of the most important pursuits, and which is of more consequence to the great human family, than any other that could be undertaken by man; that of alleviating human misery, by curing all cases of disease by the most simple, safe, and certain method of practice, I think the public will be interested to know something of me, and the reason of my having taken upon myself so important a calling, without being regularly educated to the profession, which is thought by the world to be indispensably necessary; but I shall take the liberty to disagree a little with them in this particular; for, although learning may be a great advantage in acquiring a profession, yet that alone will never make a great man, where there is no natural gift.

By giving a short sketch of the early part of my existence, and relating those accidental circumstances that have occurred during my life, and which were principally the cause of my engaging in the healing art, will enable the public to judge more correctly, whether I have taken that course, in fulfilling my duty in this life, which the God of nature hath pointed out for me. In doing this, I shall endeavor to give a plain and simple narrative of facts as they took place, and relate only those particulars of my life, with such of the cases that have come under my care, as will best convey to the reader, the most correct information of my system of practice in curing disease.

I was born February 9, 1769, in the town of Alstead, county of Cheshire, and State of New Hampshire. My father, John Thomson, was born in Northbridge, county of Worcester, and State of Massachusetts; he was twenty-five years old when I was born. My mother's name was Hannah Cobb; she was born in Medway, Mass., and was four years older than my father. I had one sister older than myself, and three brothers and one sister younger, who are all living except my second brother, who died in his fourteenth year. My oldest sister married Samuel Hills, and lives in Surry, New Hampshire, and my two brothers live in Jericho, Vermont. My youngest sister married Waters Mather, and lives in the State of Ohio.

That country was a wilderness when I was born; my father had begun there about a year before, at which time there was no house within three miles one way,

* This is an autobiography. It was many times reprinted, but no account was kept of their number.—L.

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and about one the other; there were no roads, and they had to go by marked trees. The snow was very deep when they moved there, and my mother had to travel over a mile on snow shoes through the woods to get to their habitation. My parents were poor, having nothing to begin the world with; but had to depend upon their labor for support. My father had bought a piece of wild land on credit, and had to pay for it by his labor in what he could make off the land, which caused us great hardships and deprivations for a long time.

As soon as I began to form any correct ideas of things, my mind was much irritated by the impressions made on it by my parents, who, no doubt with very good intentions, filled my young head with all kinds of hob-goblin and witch-stories, which made a very deep impression on my mind, and which were not entirely eradicated for many years. I mention this as a caution to parents, not to tell their children any thing but the truth; for young children naturally believe whatever their parents tell them, and when they frighten them with such stories, for the purpose of making them behave well, it will most generally have a very bad effect; for when they arrive at years of discretion, and find that all those stories are falsehoods, they will naturally form very unfavorable opinions of their parents, whose duty it is to set them better examples.

Domestic Medicine in Thomson's Day.

When I was between three and four years old, my father took me out with him to work. The first business I was set to do was to drive the cows to pasture, and watch the geese, with other small chores, which occupation kept me all day in the fields. I was very curious to know the names of all the herbs which I saw growing, and what they were good for; and, to satisfy my curiosity was constantly making inquiries of the persons I happened to be with, for that purpose. All the information I thus obtained, or by my own observation, I carefully laid up in my memory, and never forgot. There was an old lady by the name of Benton lived near us, who used to attend our family when there was any sickness. At that time there was no such thing as a Doctor known among us, there not being any within ten miles. The whole of her practice was with roots and herbs, applied to the patient, or given in hot drinks, to produce sweating; which always answered the purpose. When one thing did not produce the desired effect, she would try something else, till they were relieved. By her attention to the family, and the benefits they received from her skill, we became very much attached to her; and when she used to go out to collect roots and herbs, she would take me with her, and learn me their names, with what they were good for; and I used to be very curious in my inquiries, and in tasting every thing that I found. The information I thus obtained at this early age, was afterwards of great use to me.

Discovery of Lobelia.

Sometime in the summer, after I was four years old, being out in the fields in search of the cows, I discovered a plant which had a singular branch and pods, that I had never before seen, and I had the curiosity to pick some of the pods and chew them; the taste and operation produced was so remarkable, that I never forgot it. I afterwards used to induce other boys to chew it, merely by way of sport, to see them vomit. I tried this herb in this way for nearly twenty years, without knowing any thing of its medical virtues. This plant is what I have called the Emetic Herb, and is the most important article I make use of in my practice. It is very common in most parts of this country, and may be prepared and used

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in almost any manner. It is a certain counter poison, having never been known to fail to counteract the effects of the most deadly poison, even when taken in large quantities for self-destruction. There is no danger to be apprehended from its use, as it is perfectly harmless in its operation, even when a large quantity is taken; it operates as an emetic, cleanses the stomach from all improper aliment, promotes an internal heat, which is immediately felt at the extremities, and produces perspiration.

The Lobelia Patent, "My Right to the Discovery."

The exclusive right of using this plant for medical purposes is secured to me by patent, and my right to the discovery has never been disputed; though the Doctors have done every thing they could to destroy the credit of it, by false statements, representing it to be a deadly poison, and at the same time they knew to the contrary, for they have made use of it themselves for several years, and have tried to defraud me of the discovery. I feel perfectly convinced from near forty years' experience of its medical properties, that the discovery is of incalculable importance, and if properly understood by the people will be more useful in curing the diseases incident to this climate, than the drugs and medicines sold by all the apothecaries in the country.

Experimentation with Lobelia on Child Friends.

The winter I was eight years old, I was very sick with the canker-rash; but was attended by the widow Benton, who cured me by making use of such medicine as our country afforded, and I was in a short time able to be about. After I had got well, my mind was more attentive to the use of roots and herbs as medicine, than ever. I had at that time a very good knowledge of the principal roots and herbs to be found in that part of the country, with their names and medical uses; and the neighbors were in the habit of getting me to go with them to show them such roots and herbs as the doctors ordered to be made use of in sickness, for syrups, &c. and by way of sport they used to call me doctor. While in the field at work I used often to find the herb, which I tasted when four years old, and gave it to those who worked with me, to see them spit and often vomit; but I never observed any bad effect produced by it, which simple experiments eventually led me to observe the value of it in disease.

Hope of Becoming a Physician and Subsequent Disappointment.

Sometime during the year that I was sixteen years old, I heard my parents say, that as my mind was so much taken up with roots and herbs, they thought it best to send me to live with a Doctor Fuller, of Westmoreland, who was called a root doctor. This pleased me very much, and in some measure raised my ambition; but I was soon after disappointed in my hopes, for they said I had not learning enough, and they did not know how to spare me from my work, which depressed my spirits, and was very discouraging to me. I now gave up all hopes of going to any other business, and tried to reconcile myself to spend my days in working on a farm, which made me very unhappy. I had little learning, and was awkward and ignorant of the world, as my father had never given me any chance to go into company, to learn how to behave, which caused me great uneasiness.

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A Wound and Its Results Illustrating the Terrible Methods of Medical Practice, Domestic, Empirical, and Regular at that Date. "My father in dressing my wound had drawn a string through between the heel-cord and the bone, and another between that and the skin; so that two-thirds of the way round my ankle was hollow."

In the year 1788, when I was in my nineteenth year, my father purchased a piece of land on Onion river, in the state of Vermont, and on the 12th day of October, he started from Alstead, and took me with him, to go to work on the land and clear up some of it to build a house on, as it was all covered with wood. In about four days after our arrival, we were enabled to clear a small spot and to build us a camp to live in; we had to do our own cooking and washing; our fare was poor, and we had to work very hard; but we got along tolerably well till the 2d of December, when I had the misfortune to cut my ankle very badly, which accident prevented me from doing any labor for a long time, and almost deprived me of life. The wound was a very bad one, as it split the joint and laid the bone entirely bare, so as to lose the juices of my ankle joint to such a degree as to reduce my strength very much. My father sent for a Doctor Cole, of Jericho, who ordered sweet apple-tree bark to be boiled, and the wound to be washed with it, which caused great pain, and made it much worse, so that in eight days my strength was almost exhausted; the flesh on my leg and thigh was mostly gone, and my life was despaired of; the doctor said he could do no more for me; my father was greatly alarmed about me, and said that if Dr. Kitteridge, of Walpole, could be sent for, he thought he might help me; but I told him it would be in vain to send for him, for I could not live so long as it would take to go after him, without some immediate assistance. He said he did not know what to do; I told him that there was one thing I had thought of which I wished to have tried, if it could be obtained, that I thought would help me. He anxiously inquired what it was, and I told him if he could find some comfrey root, I would try a plaster made of that and turpentine. He immediately went to an old place that was settled before the war, and had the good luck to find some; a plaster was prepared by my directions and applied to my ankle, the side opposite to the wound, and had the desired effect; the juices stopped running in about six hours, and I was very much relieved; though the pain continued to be very severe and the inflammation was great; the juices settled between the skin and bone, and caused a suppuration, which broke in about three weeks; during which time I did not have three nights sleep, nor did I eat any thing. This accidental remedy was found through necessity, and was the first time the mother of invention held forth her hand to me. The success which attended this experiment, and the natural turn of my mind to those things, I think was a principal cause of my continuing to practice the healing art to this time.

Our stock of provisions being now exhausted, and my wound somewhat better, my father was very anxious to return to Alstead. He asked me if I thought I could bear the journey, if he should place me on a bed laid in a sled. I answered that I was willing to try. He immediately went to work and fixed a sled, and put me in it on a straw bed; and on the first day of January, 1789, we began our journey. There was very little snow, and the road rough, which caused the sled to jolt very much, and my sufferings were great. It was very doubtful with my father, and likewise with me, whether I should live to perform the journey; but we proceeded on, however, without any thing important happening, except wearing out the runners of our sled, and having to make new ones, and accomplished twenty

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miles the first day. At a place where we stopped all night, there was a woman whose situation appeared to me so much worse than my own, that I felt much encouraged. She had been sick with a fever, and the doctor had given so much poisonous medicine, to break the fever, as he called it, she was left in a most miserable situation. Her side and shoulder were in a putrid state, and in full as bad a condition as my ankle. My father in dressing my wound had drawn a string through between the heel-cord and bone, and another between that and the skin; so that two-thirds of the way round my ankle was hollow.

Discouraged to Desperation. Dr. Kitteridge Becomes a Good Samaritan.

When we got on to the high land there was considerable snow, and we got along much more comfortably. I had to be carried in on the bed and laid by the fire, every night during the journey. The people generally, where we stopped, treated me with kindness, and showed much pity for me in my distressed situation; but they all thought that I should not live to get through the journey. The doctors had advised to have my leg cut off, as the only means of saving my life, and all those who saw me during our journey, expressed the same opinion; and I think it would have been done had I given my consent; but I positively refused to agree to it, so the plan was given up. I preferred to take my chance with my leg on, to having it taken off; which resolution I have never repented of, to this day.

On arriving in Walpole, my father proceeded immediately to the house of the famous Dr. Kitteridge, to have him dress my wound, and get his opinion of my situation; he not being at home, and it being nearly dark, we concluded to put up for the night, and I was carried in on my bed and laid by the fire. The doctor soon came home, and on entering the room where I was, cried out in a very rough manner, Who have you here? His wife answered, a sick man. The devil, replied he, I want no sick man here. I was much terrified by his coarse manner of speaking, and thought if he was so rough in his conversation, what will he be when he comes to dress my wound; but I was happily disappointed, for he took off the dressing with great care, and handled me very tenderly. On seeing the strings that were in the wound, he exclaimed, What the devil are these halters here for? My father told him they were put in to keep the sore open. He said he thought the sore open enough now, for it is all rotten. Being anxious to know his opinion of me, my father asked him what he thought of my situation. What do I think? said he, why I think he will die; and then looking very pleasantly at me, said, though I think young man, you will get well first. In the morning he dressed my ankle again, and gave me some salve to use in future; and my father asked him for his bill, which was, I think, for our keeping and his attending me, about fifty cents. A great contrast between this and what is charged at the present time by our regular physicians; for they will hardly look at a person without making them pay two or three dollars. I have been more particular in describing this interview with Dr. Kitteridge, on account of his extraordinary skill in surgery, and the great name he acquired, and justly deserved, among the people throughout the country. His system of practice was peculiarly his own, and all the medicines he used were prepared by himself, from the roots and herbs of our own country. He was a very eccentric character, and uncouth in his manners; but he possessed a good heart, and a benevolent disposition. He was governed in his practice by that great plan which is dictated by nature; and the uncommon success he met with is evidence enough to satisfy any reasonable mind, of the

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superiority of it over what is the practice of those who become doctors by reading only, with their poisons and their instruments of torture.

Empirical Study of Field and Forest Plants.

My mind was bent on learning the medical properties of such vegetables as I met with, and was constantly in the habit of tasting every thing of the kind I saw; and having a retentive memory, I have always recollected the taste and use of all that were ever shown me by others, and likewise of all that I discovered myself. This practice of tasting of herbs and roots has been of great advantage to me, as I have always been able to ascertain what is useful for any particular disease, by that means. I was often told that I should poison myself by tasting every thing I saw; but I thought I ought to have as much knowledge as a beast, for they possess an instinct to discover what is good for food, and what is necessary for medicine. I had but very little knowledge of disease at this time; but had a great inclination to learn whatever I had an opportunity; and my own experience, which is the best school, had often called my attention to the subject.

First Overdose of Lobelia and Its Results.

The herb which I had discovered when four years old, I had often met with; but it had never occurred to me that it was of any value as medicine, until about this time, when mowing in the field with a number of men, one day, I cut a sprig of it, and gave it to the man next to me, who ate it; when he had got to the end of the piece, which was about six rods, he said that he believed what I had given him would kill him, for he never felt so in his life. I looked at him and saw that he was in a most profuse perspiration, being as wet all over as he could be; he trembled very much, and there was no more color in him than a corpse. I told him to go to the spring and drink some water; he attempted to go, and got as far as the wall, but was unable to get over it, and laid down on the ground and vomited several times. He said he thought he threw off his stomach two quarts. I then helped him into the house, and in about two hours he ate a very hearty dinner, and in the afternoon was able to do a good half day's labor. He afterwards told me that he never had anything do him so much good in his life; his appetite was remarkably good, and he felt better than he had for a long time. This circumstance gave me the first idea of the medical virtues of this valuable plant, which I have since found by forty years' experience, in which time I have made use of it in every disease I have met with, to great advantage, that it is a discovery of the greatest importance.

First Use of "Steaming" by Thomson.

When my second daughter was about two years old she was taken sick, and had what is called the canker-rash. Dr. Bliss, who lived on my farm, was sent for, and he said she had that disorder as bad as any one he ever saw. He tried his utmost skill to prevent putrefaction, which he feared would take place; but after using every exertion in his power, without doing her any good, he said he could do no more, she must die. She was senseless, and the canker was to be seen in her mouth, nose, and ears, and one of her eyes was covered with it and closed; the other began to swell and turn purple also. I asked the doctor if he could not keep the canker out of this eye; but he said it would be of no use, for she could not live. I told him that if he could do no more, I would try what I

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could do myself. I found that if the canker could not be stopped immediately, she would be blind with both eyes. She was so distressed for breath that she would spring straight up on end in struggling to breathe. I sat myself in a chair, and held her in my lap, and put a blanket round us both; then my wife held a hot spider or shovel between my feet, and I poured on vinegar to raise a steam, and kept it as hot as I found she could bear, changing them as soon as they became cold; and by following this plan for about twenty minutes, she became comfortable and breathed easy. I kept a cloth wet with cold water on her eyes, changing it often, as it grew warm. I followed this plan, steaming her every two hours, for about a week, when she began to gain. Her eyes came open, and the one that was the worst, was completely covered with canker, and was as white as paper. I used a wash of rosemary to take off the canker; and when the scale came off, the sight came out with it; and it entirely perished. The other eye was saved, to the astonishment of all who saw her, particularly the doctor, who used frequently to call to see how she did. He said she was saved entirely by the plan I had pursued, and the great care and attention paid to her. She entirely recovered from the disease, with the exception of the loss of one eye, and has enjoyed good health to this time. This was the first of my finding out the plan of steaming and using cold water. After this I found by experience that by putting a hot stone into a thing of hot water, leaving it partly out of the water, and then pouring vinegar on the stone, was an improvement. Care should be taken not to raise the heat too fast; and I used to put a cloth wet with cold water on the stomach, at the same time giving hot medicine to raise the heat inside; and when they had been steamed in this manner so long as I thought they could bear it, then rub them all over with a cloth wet with spirit, vinegar, or cold water, change their clothes and bed clothes, and then let them go to bed.

Beginning of Thomson's Theory, "Food the Fuel that Continues the Fire or Life of Man. Maintain the Internal Heat and Restore Perspiration."

I had not the most distant idea at this time of ever engaging in the practice of medicine, more than to assist my own family; and little did I think what those severe trials and sufferings I experienced in the cases that have been mentioned, and which I was driven to by necessity, were to bring about. It seemed as a judgment upon me, that either myself or family, or some one living with me, were sick most of the time the doctor lived on my farm, which was about seven years. Since I have had more experience, and become better acquainted with the subject, I am satisfied in my own mind of the cause. When ever any of the family took a cold, the doctor was sent for, who would always either bleed or give physic. Taking away the blood reduces the heat, and gives power to the cold they had taken, which increases the disorder, and the coldness of the stomach causes canker; the physic drives all the determining powers from the surface inwardly, and scatters the canker through the stomach and bowels, which holds the cold inside, and drives the heat on the outside. The consequence is, that perspiration ceases, because internal heat is the sole cause of this important evacuation; and a settled fever takes place, which will continue as long as the cold keeps the upper hand. My experience has taught me that by giving hot medicine, the internal heat was increased, and by applying the steam externally, the natural perspiration was restored; and by giving medicine to clear the stomach and bowels from canker, till the cold is driven out and the heat returns, which is the turn of the fever, they

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any relief, excepting a temporary one by stupefying her with opium and giving physic, which kept her along till nature could wear it off, when she would get a little better for a few days, and then have another turn. After hearing of my curing Mrs. Redding, they sent for me; I gave her my medicine to remove the canker, and steamed her, which gave relief in one hour. She had a very large family to attend to, having thirteen children, and before she had recovered her strength she exposed herself and had another turn; I attended again and relieved her in the same manner as before; but she could not wait till she gained her strength, and exposed herself again as before, took cold and had another turn. Her husband said I only relieved her for the time, but did not remove the cause, and being dissatisfied with what I had done, he sent for a doctor to remove the cause; who carried her through a course of physic, and reduced her so low, that she lingered along for eight weeks, being unable to do any thing the whole time; they then decided that she had the consumption, and gave her over to die. After the doctors had left her in this situation as incurable, she applied again to me; but I declined doing any thing for her, as I knew her case was much more difficult than it was before she applied to the doctor, and if I should fail in curing her, the blame would all be laid to me, or if she got well I should get no credit for it; for which reason I felt very unwilling to do any thing for her. After finishing my forenoon's work, on going home to dinner, I found her at my house, waiting for me, and she insisted so much upon my undertaking to cure her, and seemed to have so much faith in my being able to do it, that I at last told her, if she would come to my house and stay with my wife, who was sick at the time, I would do the best I could to cure her. She readily consented, and staid but three days with us; during which time I pursued my usual plan of treatment, giving her things to remove the canker, and steaming to produce a natural perspiration; at the end of the three days she went home, taking with her some medicine, with directions what to do for herself, and in a short time entirely recovered her health.

Another Case in which the Prevailing "Fashionable" Methods of that Date are Described.

In about a year after the above case, one of this family, a young man about sixteen years old, was attacked with a fever; the doctor was sent for, who followed the fashionable course of practice, and reduced him with mercury and other poisons, so that he lingered along for three or four months, constantly growing worse, till the doctor said it was a rheumatic fever, and afterwards that he was in a decline. He had taken so much mercury that it had settled in his back and hips, and was so stiff that he could not bring his hands lower than to his knees. By this time, the doctor had given him over as incurable, and he was considered a fit subject for me to undertake with. They applied to me, and I agreed to take him home to my house, and do the best I could to cure him. It was a difficult task, for I had in the first place to bring him back to the same situation he was in when he had the fever, and to destroy the effects of the poison, and regulate the system by steaming, to produce a natural perspiration; by pursuing this plan, and giving such things as I could get to restore the digestive powers, in two months he was completely restored to health; for which I received but five dollars, and this was more grudgingly paid than if they had given a doctor fifty, without doing any good at all.

Thomson Decides to Either Give Up Practice or Make Medicine His Business.

I began to be sent for by the people of this part of the country so much, that I found it impossible to attend to my farm and family as I ought; for the cases I had

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attended, I had received very little or nothing, not enough to compensate me for my time; and I found it to be my duty to give up practice altogether, or to make a business of it. I consulted with my wife and asked the advice of my friends, what was best for me to do; they all agreed, that as it seemed to be the natural turn of my mind, if I thought myself capable of such an important undertaking, it would be best to let my own judgment govern me, and to do as I thought best. I maturely weighed the matter in my mind, and viewed it as the greatest trust that any one could engage in. I considered my want of learning and my ignorance of mankind, which almost discouraged me from the undertaking; yet I had a strong inclination for the practice, of which it seemed impossible to divest my mind; and I had always had a very strong aversion to working on a farm, as every thing of the kind appeared to me to be a burthen; the reason of which I could not account for, as I had carried on the business to good advantage, and had as good a farm as any in the neighborhood. I finally concluded to make use of that gift which I thought nature, or the God of nature, had implanted in me; and if I possessed such a gift, I had no need of learning, for no one can learn that gift. I thought of what St. Paul says in his epistle to the Corinthians, concerning the different gifts by the same spirit; one had the gift of prophecy; another, the gift of healing; another, the working of miracles. I am satisfied in my own mind, that every man is made and capacitated for some particular pursuit in life, in which, if he engages, he will be more useful than he would if he happens to be so unfortunate as to follow a calling or profession, that was not congenial to his disposition. This is a very important consideration for parents, not to make their sons learn trades or professions, which are contrary to their inclinations and the natural turn of their minds; for it is certain if they do, they never can be useful or happy in following them.

Questions whether He would have been More Useful, With or Without a Systematic Medical Education.

I am convinced myself that I possess a gift in healing the sick, because of the extraordinary success I have met with, and the protection and support I have been afforded, against the attacks of all my enemies. Whether I should have been more useful had it been my lot to have had an education, and learned the profession in the fashionable way, is impossible for me to say with certainty; probably I should have been deemed more honorable in the world; but honor obtained by learning, without a natural gift, or capacity, can never, in my opinion, make a man very useful to his fellow-creatures. I wish my readers to understand me, that I do not mean to convey the idea, that learning is not necessary and essential in obtaining a proper knowledge of any profession or art; but that going to college will make a wise man of a fool, is what I am ready to deny; or that a man cannot be useful and even great in a profession, or in the arts and sciences, without a classical education, is what I think no one will have the hardihood to attempt to support, as it is contrary to reason and common sense. We have many examples of some of the greatest philosophers, physicians, and divines the world ever knew, who were entirely self-taught; and who have done more honor, and been greater ornaments to society, than a million of those who have nothing to recommend them but having their heads crammed with learning, without sense enough to apply it to any great or useful purpose.

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Arrogance of Those Practicing the "Fashionable" Mode of Disease Treatment.

Among the practising physicians, I have found, and I believe it to be a well known fact, that those who are really great in the profession, and have had the most experience, condemn as much as I do, the fashionable mode of practice of the present day, and use very little medical poisons, confining themselves in their treatment of patients to simples principally, and the use of such things as will promote digestion and aid nature; and many of them disapprove of bleeding altogether. Those of this description, with whom I have had an opportunity to converse, have treated me with all due attention and civility; have heard me with pleasure, and been ready to allow me credit for my experience, and the discoveries I have made in curing disease. The opposition and abuse that I have met with, have been uniformly from those to whom I think I can with propriety, give the name of quacks, or ignorant pretenders; as all their merit consists in their self-importance and arrogant behaviour towards all those who have not had the advantages of learning, and a degree at college.

Contentends that His Antagonists were Aggressive because he Cured Cases They could not Relieve.

This class comprises a large proportion of the medical faculty throughout our country; they have learned just enough to know how to deceive the people, and keep them in ignorance, by covering their doings under an unknown language to their patients. There can be no good reason given why all the technical terms in medical works are kept in a dead language, except it be to deceive and keep the world ignorant of their doings, that they may the better impose upon the credulity of the people; for if they were to be written in our own language, everybody would understand them, and judge for themselves; and their poisonous drugs would be thrown into the fire before their patients would take them. The ill-treatment that I have received from them, has been mostly where I have exposed their ignorance, by curing those they had given over to die; in which cases they have shown their malice by circulating all kinds of false and ridiculous reports of me and my practice, in order to destroy my credit with the people.

Decides to Formulate and then to Teach His "System" to Others.

After I had come to the determination to make a business of the medical practice, I found it necessary to fix upon some system or plan for my future government in the treatment of disease; for what I had done had been as it were from accident, and the necessity arising out of the particular cases that came under my care, without any fixed plan; in which I had been governed by my judgment and the advantages I had received from experience. I deemed it necessary, not only as my own guide, but that whatever discoveries I should make in my practice, they might be so adapted to my plan that my whole system might be easily taught to others, and preserved for the benefit of the world. I had no other assistance than my own observations, and the natural reflections of my own mind, unaided by learning or the opinions of others. I took nature for my guide, and experience as my instructor; and after seriously considering every part of the subject, I came to certain conclusions concerning disease, and the whole animal economy, which more than forty years experience has perfectly satisfied me is the only correct theory.

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Thomson Formulates His "System," in which were Devised his Famous Remedies by Number.

I found, after maturely considering the subject, that all animal bodies are formed of the four elements, earth, air, fire, and water. Earth and water constitute the solids, and air and fire, or heat, are the cause of life and motion. That cold, or lessening the power of heat, is the cause of all disease; that to restore heat to its natural state, was the only way by which health could be produced; and that, after restoring the natural heat, by clearing the system of all obstructions and causing a natural perspiration, the stomach would digest the food taken into it, by which means the whole body is nourished and invigorated, and heat or nature is enabled to hold its supremacy; that the constitutions of all mankind being essentially the same, and differing only in the different temperament of the same materials of which they are composed; it appeared clearly to my mind, that all disease proceeded from one general cause, and might be cured by one general remedy; that a state of perfect health arises from a due balance or temperature of the four elements; but if it is by any means destroyed, the body is more or less disordered. And when this is the case, there is always an actual diminution or absence of the element of fire, or heat; and in proportion to this diminution or absence, the body is affected by its opposite, which is cold. And I found that all disorders which the human family were afflicted with, however various the symptoms, and different the names by which they are called, arise directly from obstructed perspiration, which is always caused by cold, or want of heat; for if there is a natural heat, it is impossible but that there must be a natural perspiration.

No. 1. Seeking a General Remedy to "Increase the Internal Heat, Remove all Obstructions of the System, Restore the Digestive Powers of the Stomach, and Produce a Rational Perspiration, Selects Emetic Herb (Lobelia), but It was Found Inadequate. It was Like a "Fire Made of Shavings."

Having fixed upon these general principles, as the only solid foundation upon which a correct and true understanding of the subject can be founded, my next business was to ascertain what kinds of medicine and treatment would best answer the purpose in conformity to this universal plan of curing disease; for it must, I think, be certain and self-evident to every one, that whatever will increase the internal heat, remove all obstructions of the system, restore the digestive powers of the stomach, and produce a natural perspiration, is universally applicable in all cases of disease, and therefore may be considered as a general remedy.

No. 1.*

The first and most important consideration was to find a medicine that would establish a natural internal heat, so as to give nature its proper command. My emetic herb, (No. 1,) I found would effectually cleanse the stomach, and would very effectually aid in raising the heat and promoting perspiration; but would not hold it long enough to effect the desired object, so but that the cold would return again and assume its power. It was like a fire made of shavings; a strong heat for a short time, and then all go out.

*Thomson's Famous Remedies, by number: No. 1, Emetics (Lobelia, typical); No. 2, Stimulants (Capsicum, typical); No. 3, Astringents (Bayberry, typical); No. 4, Bitters (Balmoney, typical); No. 5, Restorative Tonics (Peach, typical); No. 6, Antiseptics (Myrrh, typical). Thomson's *Compound Tincture of Myrrh and Capsicum* became celebrated as "Number 6."

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No. 2. The Medicine Fixed Upon to Increase the Internal Heat was Capsicum.

After much experience and trying every thing within my knowledge, to gain this important point, I fixed upon the medicine which I have called No. 2, in my patent, for that purpose; and after using it for many years, I am perfectly convinced that it is the best thing that can be made use of to hold the heat in the stomach until the system can be cleared of obstructions, so as to produce a natural digestion of the food, which will nourish the body, establish perspiration and restore the health of the patient. I found it to be perfectly safe in all cases, and never knew any bad effects from administering it.

No. 3. Bayberry Root, combined with White Pond Lily Root Preferred. In Case the Pond Lily can not be Obtained, Hemlock, Marsh Rosemary, Sumach, Witch Hazel, Red Raspberry Leaves, or Black Cohosh may be Substituted. (Subsequently, these Remedies by Number were Continued to 6. See footnote, page 15.)

My next grand object was to get something that would clear the stomach and bowels from canker, which are more or less affected by it in all cases of disease to which the human family are subject. Canker and putrefaction are caused by cold, or want of heat; for whenever any part of the body is so affected by cold as to overpower the natural heat, putrefaction commences, and if not checked by medicine, or if the natural constitution is not strong enough to overcome its progress, it will communicate to the blood, when death will end the contest between heat and cold, by deciding in favor of the latter. I have made use of a great many articles, which are useful in removing canker; but my preparation called No. 3, is the best for that purpose, that has come to my knowledge; though many other things may be made use of to good effect.

System of Treatment Summarized.

My general plan of treatment has been in all cases of disease, to cleanse the stomach by giving No. 1, and produce as great an internal heat as I could, by giving No. 2, and when necessary, made use of steaming, in which I have always found great benefit, especially in fevers; after this, I gave No. 3, to clear off the canker; and in all cases where patients had not previously become so far reduced as to have nothing to build upon, I have been successful in restoring them to health. I found that fever was a disturbed state of the heat, or more properly, that it was caused by the efforts which nature makes to throw off disease, and therefore ought to be aided in its cause, and treated as a friend; and not as an enemy, as is the practice of the physicians. In all cases of disease, I have found that there is more or less fever, according to the state of the system; but that all fevers proceed from the same cause, differing only in the symptoms; and may be managed and brought to a crisis with much less trouble than is generally considered practicable, by increasing the internal heat, till the cold is driven out, which is the cause of it. Thus keeping the fountain above the stream, and every thing will take its natural course.

After making Reports of a Number of "Cases" Treated, comes an Intimation of Trouble with the "Fashionable Doctors."

Notwithstanding this desperate case was cured, to the astonishment of all who witnessed it, the doctors had so much influence over the people, and made so many false statements about it, that I got no credit for the cure. This woman's brother had said that her husband wanted to kill her, or he would not have sent for me.

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Such kind of ingratitude was discouraging to me; but it did not prevent me from persevering in my duty.

A short time after the above case happened, that woman's brother, who made the speech about me, was taken very sick, with what was called the yellow fever, and sent for me. I attended him and asked him if he wanted to die. He said no; why do you ask that? I told him, that I should suppose from the speech he made about my being sent for to his sister, that he did, or he would not have sent for me, if he believed his own words. He said he thought differently now. I attended him through the day with my new practice. To sweat him, I took hemlock boughs, and put a hot stone in the middle of a large bunch of them, wrapping the whole in a cloth, and poured on hot water till I raised a lively steam, and then put one at his feet and another near his body. I gave him medicine to raise the inward heat, and for the canker; after attending him through the day, I went home; and on calling to see him the next morning, found his fever had turned, and he was quite comfortable, so that he was soon about his business.

Description of a "Case," chiefly of Interest as an Illustration of the Methods of Medication One Hundred Years Ago.

I was about this time sent for to see a child in Surry, a neighboring town, which was taken very sick, and was entirely stupid. I told the father of the child that it had the canker, and made use of my common mode of practice for that difficulty. Being sent for to go to Walpole, to see two young men who had been taken the day before with the prevailing fever, I left the child, with directions how to proceed with it. I then started for Walpole, and found the two young men violently attacked with the fever. They had a brother who had been attended by the doctor for above four weeks for the same disease, and was then just able to sit up. It was thought by all, the two that were attacked last, were as violently taken as the other was; and they expressed a strong wish, that they might be cured without so long a run as their brother had. I was as anxious as they were to have a short job, and exerted all my powers to relieve them, which I was enabled to do that night, and left them in the morning quite comfortable, so that they were soon able to attend to their work. The brother who had the doctor, was unable to do any thing for several months. The doctor was paid a heavy bill for his visits; but my cure was done so quick, that it was thought not to be worthy of their notice, and I never received a cent from them for my trouble. On returning to the child that I had left the day before, I found that the doctor had been there and told them that I did not know what was the matter with the child; and had persuaded them to give him the care of it. He filled it with mercury and run it down; after having given as much mercury inside as nature could move, and the bowels grew silent, he then rubbed mercurial ointment on the bowels as long as it had any effect; after which he agreed that the child had the canker very badly; but he still persisted in the same course till the child wasted away and died, in about two months after it was first taken sick. After the child was dead, its parents were willing to allow that I understood the disorder best. The doctor got twenty-five dollars for killing the child by inches, and I got nothing.

A Journey, during which a Number of "Cases" were Treated. One being of "Cancer" again Illustrates the "Fashionable Methods" of Medication in Thomson's Day.

After returning home, I was sent for to attend a woman in the neighborhood, who had been under the care of a celebrated doctor, for a cancer in her breast. He had tortured her with his caustics, till her breast was burnt through to the

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bone; and by its corrosive nature, had caused the cords to draw up into knots; he had likewise burnt her leg to the cords. She had been under his care eleven weeks; until she was much wasted away, and her strength nearly gone. In this situation the doctor was willing to get her off his hands, and wished me to take charge of her. After some hesitation, I consented, and attended her three weeks, in which time I healed up her sores, and cleared her of the humor so effectually, that she has ever since enjoyed good health.

Illustrative of Thomson's Aggressive Sarcasm.

I attended the funeral of a young man, one of his patients, who was sick but twenty-four hours, and but twelve under the operation of his medicine. He was as black as a blackberry, and swelled so as to be difficult to screw down the lid of the coffin; when I went into the room where the corpse was, the doctor followed me, and gave directions to have the coffin secured so as to prevent the corpse from being seen; and then began to insult me, to attract the attention of the people. He said to me, I understand, sir, that you have a patent to cure such disorders as that, pointing to the corpse. I said no, and at the same time intimated what I thought of him. He put on an air of great importance, and said to me, what can you know about medicine? You have no learning; you can not parse one sentence in grammar. I told him I never knew that grammar was made use of as medicine; but if a portion of grammar is so much like the operation of ratsbane, as appears on this corpse, I should never wish to know the use of it. This unexpected application of the meaning of what he said, displeased the medical gentleman very much; and finding that many of the people present had the same opinion that I had, it irritated him so much, that he threatened to horsewhip me; but I told him that he might do what he pleased to me, provided he did not poison me with his grammar. He did not attempt to carry his threat into execution, so I have escaped his whip and his poison; but the people were justly punished for their ingratitude and folly, in preferring death and misery, because it was done more fashionably, to a mode of practice by which they might relieve themselves in a simple and safe manner.

A Journey to New York to Study Yellow Fever.

In the spring of the year 1806, I came to a determination to go to New York, for the purpose of ascertaining the nature of the yellow fever, having been impressed with the idea, that this disease was similar to that which had been prevalent in different parts of the country, only differing in causes which were local.

On my arrival, I looked round to find a place to board, and took up my lodgings with a Mr. Kavanagh, an Irishman, and a Roman Catholic. After spending some time in viewing the city, I applied to the Mayor of the city, and to the Board of Health, to ascertain whether I could have an opportunity to try the effect of my medicine and system of practice on the prevailing fever. They told me that I could; but that I could get no pay for it by law. I went to see Doctor Miller, who was then President of the Board of Health, and had some conversation with him upon the subject. He told me the same as the Mayor had, and inquired of me in what manner I expected to give relief; I told him my plan was to cause perspiration. He said if I could cause them to sweat, he thought there was a good chance to effect a cure.

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Stricken with Yellow Fever, Thomson Takes a Course in His Own "System."

After spending several days in New York, I went to West Chester Creek to procure some medicine. I thought that I was going to have the yellow fever, for I felt all the symptoms, as I thought, of that disease; my strength was nearly gone, my eyes were yellow, and a noise in my head; my tongue was black, and what passed my bowels was like tar. I was among strangers, and had little money; I went to the house of a Quaker woman, and asked to let me stay with her that day; she gave her consent. Had but little medicine with me, and could find nothing that I could relish but salt and vinegar; I used about half a pint of salt, and double that quantity of vinegar, which gave me relief, and I gained so much strength, that the next day I was able to return to the city of New York. On my arrival there, I was so weak that it was with the greatest difficulty I could walk to my boarding house, which was about forty rods from the place where we landed. I immediately took Nos. 2 and 3, steeped, and No. 4; in a short time, I began to have an appetite; the first food that I took was a piece of smoked salmon, and some ripe peach sauce. I soon recovered my strength and was able to be about. This satisfied me that I had formed a correct idea of this fatal disease; that it was the consequence of losing the inward heat of the body, and bringing it to a balance with the surrounding air; and the only method by which a cure can be effected, is by giving such medicine as will increase the fever or inward heat to such a degree as to get the determining power to the surface, by which means perspiration will take place, and which is called the turn of the fever; if this is not accomplished either by medicine, or by nature being sufficient to overcome the disease, mortification will be as certain a consequence as it would be if a person was strangled. The reason why they lose their strength in so short a time, is because it depends wholly upon the power of inward heat; and as much as they lose of that, so much they lose of their strength and activity.

An Advocate of Pure and Good Food, thus Anticipating the Government Crusade Nearly a Century Later.

I will here make a few remarks upon the food taken into the stomach, which is of the utmost importance to the preservation of health. While I was in New York, I took particular notice of their manner of living; and observed that they subsisted principally upon fresh provisions, more particularly the poorer class of people; who are in the habit in warm weather of going to market at a late hour of the day, and purchasing fresh meat that is almost in a putrid state, having frequently been killed the night previous, and being badly cooked, by taking it into the stomach, will produce certain disease; and I am convinced that this is one of the greatest causes that those fatal epidemics prevail in the hot season, in our large seaports. Mutton and lamb is often drove a great distance from the country, and having been heated and fatigued, then are cooled suddenly, which causes the fat to turn to water; and often when killed, are in almost a putrid state, and the meat is soft and flabby. Such meat as this, when brought into the market on a hot day, will turn green under the kidneys in two or three hours, and taken into the stomach will putrify before it digests, and will communicate the same to the stomach, and the whole body will be so affected by it, as to cause disorders of the worst kind. If people would get into the practice of eating salt provisions in hot weather, and fresh in cold, it would be a very great preventive of disease. One ounce of putrid flesh in the stomach is worse than the effect

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produced by a whole carcass on the air by its effluvia. Much more might be said upon this important subject; but I shall defer it for the present, and shall treat more upon it in another part of the work. It is a subject that has been too much neglected by our health officers in this country.

Illustrative of Thomson's Methods of Procuring Remedies.

In November, I went to Plum Island to collect medicine; on my way I called on Joseph Hale, Esq., of Pepperell, and engaged him to come down with his wagon in about three weeks, to bring back what medicine I should collect. I went by the way of Newburyport; and after being on the Island three or four days, collected such roots as I wanted and returned to that place.

Introducing Dr. French. The Beginning of Thomson's Persecution, or Prosecution, as One Looks at the Matter.

While there, being in a store in conversation with some persons, there came in a man from Salisbury mills, by the name of Osgood, who stated that he was very unwell, and that his wife lay at the point of death, with the lung fever; that she had been attended by Dr. French, who had given her over. One of the gentlemen standing by, told him that I was a doctor, and used the medicine of our own country. He asked me if I would go home with him, and see his wife. As I was waiting for Mr. Hale, and had nothing to do, I told him I would, and we immediately started in the chaise for his home, which was about six miles. On our arrival, he introduced me to his wife as a doctor who made use of the medicine of our country; and asked her if she was willing that I should undertake to cure her. She said if I thought that I could help her she had no objection. I gave my opinion that I could, and undertook, though with some reluctance, as I was in a strange place, and no one that I knew. I proceeded with her in my usual method of practice, and in about fourteen hours her fever turned, and the next day she was comfortable, and soon got about.

This cure caused considerable talk among the people in the neighborhood, who thought very favorably of me and my practice; but it soon came to the ears of Dr. French, who was very much enraged to think one of his patients, that he had given over, should be cured by one whom he called a quack; and attempted to counteract the public impression in my favor, by circulating a report that the woman was getting better, and sat up the greatest part of the day before I saw her; but this was denied by the woman's husband, and known by many to be false.

While I remained in this place, waiting for Mr. Hale to come down with his wagon to carry home my medicine, I was called on to attend several cases, in all of which I was very successful; most of them were such as had been given over by the doctors. One of them was the case of a young man, who had cut three of his fingers very badly, so as to lay open the joints. Dr. French had attended him three weeks, and they had got so bad that he advised him to have them cut off, as the only alternative. The young man applied to me for advice. I told him if I was in his situation, I should not be willing to have them cut off till I had made some further trial to cure them without. He requested me to undertake to cure him, to which I consented and began by clearing the wound of mercury, by washing it with weak lye; I then put on some drops, and did it up with a bandage, which was kept wet with cold water. While I was dressing the wound, a young man, who was studying with Dr. French, came in and made a great fuss, telling the young man that I was going to spoil his hand. I told him that I was accountable

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for what I was doing, and that if he had any advice to offer I was ready to hear him; but he seemed to have nothing to offer except to find fault, and went off, after saying that Dr. French's bill must be paid very soon. I continued to dress his hand, and in ten days he was well enough to attend to his work, being employed in a nail factory. Soon after, I saw him there at work, and asked him how his fingers did; he said they were perfectly cured; he wished to know what my bill was for attending him. I asked him what Dr. French had charged, and he said he had sent his bill to his mother, amounting to seventeen dollars; I told him I thought that enough for us both, and I should charge him nothing.

After a Number of Journeys, in which his "System" was Used Continually, Thomson again Meets Dr. French.

After stopping at Pelham three weeks, in which time I had as much practice as I could attend to, I went to Salisbury Mills, where I was very cordially welcomed by all those who had been attended by me the season before. I was called on to practise in this place and Newburyport, and my success was so great that it caused much alarm among the doctors, and a class of the people who were their friends, who did all they could to injure me, and destroy my credit with the people. A considerable part of the patients, who were put under my care, were such as the doctors had given over, and those being cured by me, had a tendency to open the eyes of the people, and give them a correct understanding of the nature of their practice, and convince them that a simple and speedy cure was more for their interest and comfort, than long sickness, pain, and distress; besides having to pay exorbitant doctors' bills, for useless visits and poisonous drugs, which had no other effect than to prolong disease, and destroy the natural constitution of the patient.

Among those doctors who seemed so much enraged against me, for no other reason that I could learn, than because I had cured people whom they had given over, and instructed them to assist themselves when sick, without having to apply to them; there was none that made themselves so conspicuous as Dr. French. I had considerable practice in his neighborhood, and was very successful in every case; this seemed to excite his malice against me to the greatest pitch; he made use of every means in his power, and took every opportunity to insult and abuse me both to my face and behind my back. A few of the inhabitants who were his friends, joined with him, and became his instruments to injure me; but a large proportion of the people were friendly to me, and took great interest in my safety and success. The doctor and his adherents spread all kinds of ridiculous reports concerning me and my practice, giving me the name of the old wizzard; and that my cures were done under the power of witchcraft. This foolish whim was too ridiculous for me to undertake to contradict, and I therefore rather favored it merely for sport; many remarkable circumstances took place tending to strengthen this belief, and some of the silly and weak-minded people really believed that I possessed supernatural powers. This will not appear so strange, when we take into view, that the people generally were ignorant of my system of practice, and when they found that I could cure those diseases that the doctors, in whom they had been in the habit of putting all their confidence, pronounced as incurable; and that I could turn a fever in two days, which would often take them as many months, they were led to believe that there was something supernatural in it.

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Thomson Becomes Aggressively Sarcastic.

A man who was one of the friends of Dr. French, and who had been very inimical to me, doing all in his power to injure and ridicule me, sent word one day by a child, that his calf was sick, and he wanted me to come and give it a green powder and a sweat. Knowing that his object was to insult, I returned for answer, that he must send for Dr. French, and if he could not cure it, I would come, for that was the way that I had to practise here.

After a Journey, and a Rest at Home, Thomson Again Invades the Territory of Dr. French, who Prepares for Him a Trap.

In the year of 1808, I went again to Salisbury, and on my way there, stopped at Pelham, and attended and gave relief in several cases of disease. On my arrival at Salisbury Mills, where I made it my home, I was immediately called on to practise in that place and the adjacent towns. Many came to me from different parts, whose cases were desperate, having been given over by the doctors, such as humors, dropsies, mortifications, fellons, consumptions, &c. Fevers were so quickly cured, and with so little trouble, that many were unwilling to believe they had the disease. My success was so great, that the people generally were satisfied of the superiority of my mode of practice over all others. This created considerable alarm with the doctors, and those who sided with them. Dr. French seemed to be much enraged, and having failed to destroy my credit with the people by false reports, and ridiculous statements of witchcraft, shifted his course of proceeding, and attempted to frighten me by threats, which only tended to show the malice he bore me; for no other reason, that I could conceive of, as I had never spoken to him, than because of my success in relieving those he had given over to die. He would frequently cause me to be sent for in great haste to attend some one in his neighborhood, who was stated to be very sick; but I saw through these tricks, and avoided all their snares. It seemed to be his determination, if he failed in destroying my practice, to destroy me. Being in company one day at Salisbury village, with Mr. Jeremiah Eaton, of Exeter, whose wife was under my care for a dropsical complaint, I was sent for four times to visit a young man at the house of Dr. French; the last time, a man came on horseback in the greatest haste, and insisted that I should go and see him. I asked why Dr. French did not attend him; he answered that he had rather have me. Being convinced, from the appearance of things, that it was an attempt to put some trick upon me, I refused to go, and the man returned. In a short time after, Dr. French came into the village, and Mr. Eaton, who was present when they came after me, asked him what ailed the young man at his house; he said nothing, but that he was as well as anybody. This revealed the whole secret. Mr. Eaton then asked him why he caused me to be sent for so many times, under a false pretence. He said to see if I dared to come into his neighborhood; that he did not care how much I practised on that side of the river; but if I came on his, he would blow my brains out; that I was a murderer, and he could prove it. Mr. Eaton observed that it was a heavy accusation to make against a man, and that he ought to be made to prove his words, or to suffer the consequence; that his wife was under my care, and if I was a murderer, he ought to see to it. Dr. French again repeated the words, with many threats against me, and showed the spite and malice of a savage.

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Thomson has Dr. French Arrested, Wins His Case, and Resumes His Practice.

Mr. Eaton and others of my friends considered my life in danger; and came immediately to me and related what had been said by the doctor; and advised me to be on my guard. I had to pass his house every day to visit my patients; but did not consider myself safe in going in the night, nor in the day time without some one with me. I continued in this manner for several days, and finding his malice towards me to be as great as ever, and still continuing his threats; with the advice of my friends, I was induced to have resort to the law for protection. I went to Newburyport and entered a complaint against him before a magistrate, who granted a warrant, and he was brought before him for a trial. My case was made out by fully proving his words; he asked for an adjournment for three hours to make his defence, which was granted. He then brought forward evidence in support of his character, and proved by them that he had always been a man of his word. The Justice told him that he thought he proved too much, and to his disadvantage, for it had been fully proved that he had made the threats alleged against him, and to prove that he was a man of his word, went to satisfy the court that the complaint was well grounded. He was laid under two hundred dollars bonds to keep the peace and appear at the next court of common pleas. He appeared at the next court, was ordered to pay all the cost, and was discharged from his bail. This was an end of our controversy for that time; but his malice continued against me long after; seeking every means to destroy me and prevent my practising, that he could devise; but proceeded with more caution, which caused me a great deal of trouble and much suffering, as will be hereafter related.

I continued to practise in this place, and had as many patients as I could possibly attend upon, notwithstanding the opposition I constantly met with from the doctors and their friends; for with all their arts and falsehoods they were not able to prevent those laboring under complaints, which they had found could not be removed by the fashionable mode of treatment, from applying to me for relief; none of whom but what were either cured or received great relief by the practice. Some of the most extraordinary cases I shall give a particular account of for the information of the reader.

Dr. French Seeks Revenge.

Previously to my difficulty with Dr. French, as has been before mentioned, Mrs. Eaton and another woman by the name of Lifford, came to me at Salisbury Mills from Exeter. Their complaint was dropsy; and were both desperate cases, having been given over by the doctor who had attended them. Mrs. Eaton was swelled to such a degree, that she could not see her knees as she sat in a chair, and her limbs in proportion. I felt unwilling to undertake with them, as I considered there would be but little chance of a cure; and declined doing any thing for them, and sent them away, stating that there was no place that they could get boarded. They went away as I supposed to go home; but they soon returned, and said they had found a place where they could stay, and a young woman had agreed to nurse them. I undertook with them very reluctantly; but could not well avoid it. I gave them some medicine, and it operated favorably on both, especially on Mrs. Lifford; then gave strict orders to the nurse, to attend them attentively through the night, and keep up a perspiration; but she almost totally neglected her duty, spending her time with the young people. On visiting them in the morning I was very much hurt to find my directions neglected. Mrs. Lifford

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was quite poorly; and stated to me that the nurse had neglected her, and that she had got her feet out of bed; her perspiration had ceased, and other symptoms appeared unfavorable.

I attended upon her through the day and did all I could to relieve her, but could not raise a perspiration again. She continued till the next night about midnight and died. My hopes of doing her any good were small; but think that if she had not been neglected by the nurse, there might have been some small chance for her, as the first operation of the medicine was so favorable. Her bowels were in a very bad state, and had been almost in a mortified condition for three weeks, and what passed her was by force, and very black.

This caused great triumph among my enemies, and Dr. French tried to have a jury on the body; but he could not prevail; for the circumstances were well known to many, and all that knew anything about it, cleared me from all blame. The nurse said that I did all I could, and if there was any blame it ought to fall on her and not on me. So they failed in their attempt to make me out a murderer; but this case was laid up to be brought against me at another time.

Thomson Meditates on Contrasts.

This shows what may be done by the folly of people, and the malice and wickedness of designing men, who care more for their own interested ends, than for the health and happiness of a whole community. The fashionable educated doctor may lose one-half his patients without being blamed; but if I lose one out of several hundred of the most desperate cases, most of which were given over as incurable, it is called murder.

In Dr. Shephard, Thomson at last Finds an Appreciative Physician Observer.

As soon as I could get the patients under my care in a situation to leave them, I left Salisbury Mills, and went to Exeter, and commenced practising in my usual way, and was applied to from all parts. I had not so many to attend as I had in some places; but they were all of the most desperate nature, such as had been given over by the doctors, in all of which I met with great success. Many of the cases had been attended by Dr. Shephard; he had attended with me upon his patients at Salisbury; was a very plain, candid sort of a man, and treated me with much civility. I well remember his first speech to me, which was in the following words: "Well, what are you doing here, are you killing or curing the people?" I replied, you must judge about that for yourself. "Well," said he, "I will watch you, not for fear of your doing harm, but for my own information; I wish you well, and will do you all the good I can." I always found him candid and friendly, without any hypocrisy. He once called on me to visit with him one of his patients in the town where he lived, who had the rheumatism in his back and hips. The doctor had attended him about two months, and said he had killed the pain, but his back was stiff, so that he could not bring his hands below his knees. I attended him about forty-eight hours, and then went with him to see the doctor, which was half a mile; the doctor appeared to be much pleased to see him so well, and have the use of his limbs; for he could stoop and use them as well as he ever could. He said that he was as glad for the young man's sake as though he had cured him himself. He frequently came to see Mrs. Eaton, whom I was attending for the dropsy; and expressed much astonishment at the effect the medicine I gave had in relieving her of a disease which he had considered incurable. At one time when conversing with her upon her situation, and finding

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her so much better, having been reduced in size above fifteen inches, he expressed himself with some warmth on the occasion, saying, that it was what he had never seen or heard of being done before, and what he had considered impossible to be done with medicine. Addressing himself to me with much earnestness, inquired how it was that I did it. I replied, you know doctor that the heat had gone out of the body, and the water had filled it up; and all I had to do was to build fire enough in the body to boil away the water. He burst into a laugh, and said that it was a system very short.

Again Illustrating "Fashionable" Medication of that Date, and Thomson's Opinion of Disease.

While practising in Exeter, I had many desperate cases from the different parts of the country, and from Portsmouth. One from the latter place I shall mention, being different from what I had before witnessed. A woman applied to me who had the venereal, in consequence, as she stated, of having had a bad husband; which I believed to be true. She had been attended by the doctors in Portsmouth for nearly a year, who had filled her with mercury, for the purpose of curing the disorder till the remedy had become much worse than the disease. Her case was alarming, and very difficult; she was brought on a bed, being unable to sit up; and seemed to be one mass of putrefaction. I proceeded with her in my usual way of treating all cases where the system is greatly disordered, by giving medicine to promote perspiration, steaming to throw out the mercury, and restore the digestive powers; and in three weeks she returned home entirely cured. Another woman came to me from the same place, who had been sick five years, which had been in consequence of having had the same disease, and the doctors had filled her with mercury to kill the disorder, as they called it, then left her to linger out a miserable existence. When she stated her case to me, I felt very unwilling to undertake with her, apprehending that it would be very uncertain whether a cure could be effected, having been of so long standing; but she insisted upon it so strongly, that I could not put her off. After attending upon her three weeks, however, her health was restored, and she returned home well; and in less than a year after, she had two children at one birth. She had not had a child for eight years before. This disease is very easily cured in the first stages of it, by a common course of medicine, being nothing more than a high stage of canker seated in the glands of certain parts of the body, and if not cured, communicates to the glands of the throat and other parts; by giving mercury, the whole system is completely disordered, and although the disease may disappear, it is not cured; and there is more difficulty in getting the mercury out of the body of one in this situation, than to cure a dozen of the disease who have not taken this dangerous poison.

The Medical Profession "Alarmed" and for the Second Time Charge Thomson with "Witchcraft."

While in Exeter, I had a case of a young man, son of Col. Nathaniel Gilman, who was in a decline. He was about fourteen years old, and had been troubled with bleeding at the nose. They had made use of such powerful astringents, with corrosive sublimate snuffed up his nose, that the blood vessels in that part seemed to be shrunk up, and his flesh much wasted away; I carried him through a course of medicine, and gave an equal circulation of blood through the body, and stopped its course to the head; then raised a natural perspiration, restored the digestive powers, and regulated the system, so as to support the body with food instead of

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medicine. In a short time he recovered his health so that he commanded a company of militia at the alarm at Portsmouth, during the late war.

My success while at this place, and the many extraordinary cures I performed, gained me great credit among the people; but the medical faculty became much alarmed, and made use of every artifice to prejudice them against me. The foolish stories about witchcraft, which had been made a handle of at Salisbury, were repeated here, with a thousand other ridiculous statements for the purpose of injuring me; but I treated them with contempt, as not worthy of my notice, except in some instances, to amuse myself with the credulity of the ignorant, who were foolish enough to believe such nonsense.

Thomson Invades the Territory of Dr. Manasseh Cutler. (See Bulletin, Lloyd Library No. VII, for Portrait and History of Cutler.) Again He Lays Up Trouble for Himself.

Some time towards the close of the summer, while I was at Exeter, I was sent for to go to Portsmouth to see a young man by the name of Lebell, who was in a very dangerous situation, supposed by his friends to be in a dying state, having been given over by Drs. Cutler and Pierpont, at ten o'clock that morning. I arrived about two in the afternoon. He had been attended by the two doctors above named for upwards of a month, to cure the venereal; they had filled him with mercury, so that he had swelled all over with the poison. The doctors pronounced it to be the dropsy. His legs had been scarified to let off the water; the disorder and the mercury had gained the power, and nature had submitted. I at once pronounced it to be a desperate case, and told the French Consul, who had the care of him, that I could give no encouragement that I could do him any good; but he was very solicitous for me to do something for him. I told him the only chance was to raise perspiration, and that twenty-four hours would determine his case; for he would either be better in that time, or be dead. The idea of perspiration caused him to urge me to try; and he said if I could effect it, he would give me one hundred dollars; the doctors had tried for a month, and could not succeed. I gave him some medicine, then put on the clothes by degrees, until he was shielded from the air, and he sweat freely in about an hour. The two doctors were present, and seemed astonished at my success; they walked the room, talked low, then went out. I staid with him till six o'clock, and the symptoms seemed to be favorable; he sweat profusely, and spit much blood. I told the nurse to keep him in the same situation till I returned; went out and was gone about an hour, and came back again with Mr. Underwood. When we came into the room, found that the doctors had taken him out of bed and sat him in a chair, and opened the window against him. I told them that their conduct would cause his death, and I would do no more for him; but should give him up as their patient.

It appeared to me that they were afraid I should cure him, and thus prove the superiority of my practice over theirs; for they had tried a month to get a perspiration, without success, and I had done it in one hour. The man fainted before I left the room. I went home with Mr. Underwood and staid that night, and left them to pursue their own course; the man died before morning. Instead of getting the hundred dollars, as was agreed, I never got a cent for all my trouble of coming fifteen miles, and returning back again on foot; and besides this loss, afterwards,—when I came to be persecuted by the faculty,—the above two doctors gave their depositions against me, in which I was informed they swore that I killed this man, notwithstanding they had given him over to die the

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morning before I saw him, and they had taken him out of my hands, as above stated. On being informed that they were trying to support a complaint against me, I got the depositions of Mr. Underwood and others, who were knowing to the facts, to contradict these false statements. On finding that I was determined to oppose them, and prove what they had sworn to be all false, they thought proper to drop the matter; but I was informed they had sworn that my medicine was of a poisonous nature, and if it did not cause the patient to vomit soon after being taken, they would certainly die. It is unnecessary for me to contradict this, for its incorrectness and absurdity is too well known to all who have any knowledge of the medicine I use.

After a number of Journeys is Called by a Man Who Heard that he, Thomson, "Sweat His Patients To Death." Description of Treatment.

I was frequently in Portsmouth to visit those who had been sent to me to be attended upon at Exeter. Sometime in September in 1808, when there, I was called on to visit Mr. Richard Rice, who was sick with the yellow fever, as it was called. The reason for his sending for me, was in consequence of having heard the reports of the doctors, that I sweat my patients to death. He conceived an idea that if he could sweat, he should be better; but they would not allow him to be kept warm, taking the clothes off of him, and keeping the windows and doors open; no fire was permitted in the room, while he was shivering with the cold. The plan was to kill the fever, and to effect this with more certainty, the doctor had bled him, and told his sister that he had given him as much ratsbane as he dared to give, and if that did not answer he did not know what would.

I began to give him medicine a little before night, and in one hour perspiration took place. He was so weak that he was unable to help himself. In the morning the doctor proposed to bleed him; but he was dismissed. I was with him till the symptoms were favorable, and then left him in the care of three persons whom I could confide in. After I was gone, Dr. Brackett came into the room where the patient was, in a great rage, saying that they were killing him; for the mortification would soon take place, in consequence of keeping him so warm. He was asked by one of those present, in which case mortification was most likely to take place, when the blood was cold and thick, or warm and thin. He suspected some quibble, and would not give an answer; and it was immaterial which way he answered; for in either case he had no grounds to support an argument upon, but what might be easily refuted. After he had failed in the interference with those who had the care of the patient, he went to his wife and other relations, and tried to frighten them; but he did not succeed, for they were well satisfied with what was doing.

The patient was much out by spells, sometimes imagining himself to be a lump of ice; but my directions were pursued by the person I left in charge of him during the night, keeping up a perspiration, in the morning he was much relieved, and had his right mind. He had no pain except in the lower part of the bowels; to relieve which he was very anxious that I should give him some physic. I opposed this, being confident that it would not do in such putrid cases. He was so urgent, however, I gave him some, which operated very soon; and the consequence was, that it reinforced his disorder, and threw him into the greatest distress. He asked for more physic, but I told him that I would not give him any more, for I was satisfied of the impropriety of giving it in such cases, and I have never given any since. It checked the perspiration, and drew the determining

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powers from the surface inward; so that I had to go through the same process again of raising perspiration, and vomiting, which was much more difficult than at first, and it was with the greatest attention that I was able to keep off the mortification for twelve hours that he was kept back by taking this small dose of physic. I kept up the perspiration through Friday and Saturday, and on Sunday morning when I called to see him, he was up and dressed. On asking how he did, he said as strong as you are, and took me under his arm and carried me across the room. On Monday he was down on the wharf attending to his business.

This cure caused considerable talk in the town, and because it was done so quick, the doctors said that there was but little ailed aim, and he would have got well himself if he had taken the physic and been left alone; but those who saw it were convinced to the contrary; others doubted, and said among themselves, how can a man, who has no learning, and never studied physic, know how to cure disease?

Outward and Inward Heat.

I continued to practise in Portsmouth and vicinity during this autumn, and while there, was sent for to go to Salisbury, to see a child that had been attended by a woman for several days, who I had given information to, but they said the perspiration would not hold; and they wished for further information. On seeing the child, I at once found that they had kept about an equal balance between the outward and inward heat; when they gave medicine to raise the inward heat and start the determining power to the surface, they at the same time kept the outward heat so high as to counteract it. After explaining to them the difficulty, I raised the child up and poured on to it a pint of cold vinegar, and it immediately revived. Applied no more outward heat, but only to shield it from the air; and gave the warmest medicine inward, on the operation of which, the child grew cold and very much distressed. As soon as the inward heat had gained the full power, and drove the cold out, the circulation became free, and the child was relieved from pain and fell asleep; the next day the heat was as much higher than what was natural, as it had been lower the day before; and when heat had gained the victory over cold, the child gained its strength and was soon about, perfectly recovered.

Again Trespasses on Territory of Dr. French, is Arrested, Fined and Reprimanded.

I had not practised in Salisbury before, since I went to Exeter, which was in June, and my returning there seemed to give Dr. French great offence. He had been to see the child mentioned above, and tried to discourage the people from using my medicine; and threatened them that he would have them indicted by the grand jury, if they made use of any without his consent; his threats, however, had very little effect, for the people were well satisfied of the superiority of my practice over his. About this time the bonds for his good behavior were out; I did not appear against him, and when the case was called, the court discharged him and his bail, on his paying the cost. The action was brought on a complaint in behalf of the Commonwealth; but I had caused another action of damage to be brought against him, which was carried to the Supreme Court, and tried at Ipswich the spring following. I employed two lawyers to manage my case, and brought forward two witnesses to prove my declaration, who swore that the defendant made the assertion, that I was guilty of murder and he could prove it. His lawyer admitted the fact, but pleaded justification on the part of his client,

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and brought witnesses on the stand to prove that what he had said was true. The young woman who nursed Mrs. Lifford, and by whose neglect she took cold, swore to some of the most ridiculous occurrences concerning the death of that woman, that could be uttered, which were perfectly contradictory to every thing she had before confessed to be the truth. Another young woman, the daughter of a doctor at Deerfield, made a statement, to make it appear that I was the cause of the death of the three children, who died as has been before related. I had no knowledge of ever seeing this woman, and have since ascertained that she was not at the house but once during the sickness, and then did not go into the room where the sick were; and her exaggerated account must have been made up of what she had heard others say.

These things were a complete surprise to me, not thinking it possible that people could be induced to make such exaggerated statements under the solemnity of an oath. I could have brought forward abundance of testimony to have contradicted the whole evidence against me if there was time, but not expecting that the cause would have taken the course it did, was unprepared. There appeared to be a complete combination of the professional craft against me, of both the doctors and lawyers, and a determination that I should lose the cause, let the evidence be what it might. My lawyers gave up the case without making a plea; and the judge gave a very partial charge to the jury, representing me in the worst point of view that he possibly could, saying that the evidence was sufficient to prove the facts against me, and that if I had been tried for my life, he could not say whether it would hang me or send me to the state prison for life. The jury of course gave their verdict against me, and I had to pay the cost of the court.

The counsel for Dr. French asked the judge whether a warrant ought not to be issued against me, and I be compelled to recognize to appear at the next court, to which he answered in the affirmative. This so frightened my friends, that they were much alarmed for my safety, and advised me to go out of the way of my enemies, for they seemed to be determined to destroy me. I went to Andover to the house of a friend, whose wife I had cured of a cancer, where I was very cordially received, and staid that night. The next day I went to Salisbury Mills, and made arrangements to pay the cost of my unfortunate lawsuit.

The Lovett Case, the Beginning of Thomson's Famous Trial.

While practising in Beverly, was called on by a Mr. Lovett, to attend his son, who was sick, as they supposed with a bad cold; some thought it a typhus fever. I was very much engaged in attending upon the sick at the time, and could not go with him; he came after me three times before I could go. On seeing him, found that he complained of a stiff neck, and appeared to be very stupid, and had no pain. His aunt, who took care of him, said that he would certainly die, for he had the same symptoms as his mother, who died a short time before. I gave some medicine which relieved him; the next day carried him through a course of the medicine, and he appeared to be doing well. Being called on to go to Salem, I left him in the care of Mr. Raymond, with particular directions to keep in the house and not expose himself. This was on Wednesday, and I heard nothing from him, and knew not but what he was doing well, till the Sunday afternoon following, when I was informed that he was worse. I immediately inquired of Mr. Raymond, and learned from him that he had got so much better, he had been down on the side of the water, and returned on Friday night; that the weather was very cold, being in the month of December; that he had been

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chilled with the cold, and soon after his return had been taken very ill; he staid with him on Saturday night, and that he was raving distracted all night; that he had not given any medicine, thinking he was too dangerously sick for him to undertake with.

I told the young man's father, that it was very doubtful whether I could do any thing that would help him; but that I would try, and do all I could. I found that the patient was so far gone that the medicine would have no effect, and in two hours told him that I could not help his son, and advised him to call some other advice; this was said in presence of Elder Williams, and Mr. Raymond. Mr. Lovett made answer that if I could not help his son, he knew of none who could; and was very desirous for me to stay with him all night, which I did, and stood by his bed the whole time. He was much deranged in his mind till morning, when he came to himself, and was quite sensible. I then again requested the father to send for some other doctor, as I was sensible that I could do nothing for him that would be of any benefit. He immediately sent for two doctors, and as soon as they arrived, I left him in their care. The two doctors attended him till the next night about ten o'clock, when he died. I have been more particular in giving the history of this case, because two years after it was brought as a charge against me for murdering this young man. The father and friends expressed no dissatisfaction at the time, in regard to my conduct, except they thought I ought not to have neglected the patient so long; but it was a well known fact, that I attended as soon as I knew of his being worse, and that the whole cause of his second attack was owing to his going out and exposing himself, and could not be imputed as any fault of mine.

After a Period of Practice in Various Localities, came Thomson's "Treatment" of Captain Trickey.

Some time this season I was sent for to attend Captain Trickey, who was very sick. I examined him and was confident that I could not help him, and took my hat in order to leave the house. His family insisted on my stopping and doing something for him; but I told them that I thought he was in a dying state, and medicine would do no good. I told his son that in all probability, he would not be alive over twenty-four hours, and that he had better go for some other help, for I could do him no good. I told the wife that I should give no medicine myself, but as they had some in the house that they knew the nature of, she might give some of it to her husband, which she did. Two doctors were sent for; the first one that arrived bled him, and he soon breathed very short, and grew worse; the other doctor came, and said that his breathing short was in consequence of the medicine I had given him; but by this he did not gain credit, for all the family knew to the contrary; and the woman soon after told me of his speech. The patient continued till the next day about ten o'clock, and died. Soon as he was dead, the doctors and their friends spared no pains to spread the report in every direction, that I had killed this man with my screw auger, a cant name given to my emetic herb, in consequence of one of my patients, when under the operation of it, saying that it twisted in him like a screw auger. This was readily seized upon by the doctors, and made use of for the purpose of trying to destroy the reputation of this medicine by ridicule. They likewise gave similar names to several other articles of my medicine, for the same purpose; and represented them as the names by which I called them. They had likewise given me several names and titles, by way of reproach; such as the sweating and steaming doctor; the Indian doctor; the old wiz-

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zard; and sometimes the quack. Such kind of management had a great effect on the minds of many weak minded people; they were so afraid of ridicule, that those whom I cured were unwilling to own it, for fear of being laughed at for employing me.

The circumstance of the death of the above mentioned Capt. Trickey, was seized upon by the doctors and their friends, and the most false and absurd representations made by them through the country, with the intention of stopping my practice, by getting me indicted for murder, or to drive me off; but my friends made out a correct statement of the facts, and had them published, which put a stop to their career for that time. I continued my practice, and had a great number of the most desperate cases, in most of which I was successful. The extraordinary cures I had performed, had the tendency to make many people believe, that I could cure every one who had life in them, let their disease be ever so bad; and where I had attended on those who were given over as incurable, and they died, whether I gave them any medicine or not, the report was immediately circulated that they were killed by me, at the same time the regular doctors would lose their patients every day, without there being any notice taken of it. When their patients died, if appearances were ever so much against their practice, it was said to be the will of the Lord, and submitted to without a murmur; but if one happened to die that I had any thing to do with, it was readily reported by those interested in destroying my credit with the people, that I killed them.

Arrest, Imprisonment and Trial. In this, but for the Testimony of Dr. Cutler, Thomson would Probably have Fared Much Worse. This (see note, page 37) Marks the Beginning of the Medical Laws in America.

I shall now proceed to give the particulars of one of the most important circumstances of my life, in as correct and impartial a manner as I am capable of doing from memory; in order to show what I have suffered from the persecutions of some of the medical faculty, for no other reason, as I conceive, than that they feared my practice would open the eyes of the people, and lessen their importance with them; by giving such information as would enable them to cure themselves of disease, without the aid of a doctor; and from many others, who were governed altogether by the prejudices they had formed against me by the false reports that had been circulated about my practice, without having any other knowledge of me. Many of the latter, however, have since been convinced of their error, have a very favorable opinion of my system, and are among my best friends.

After practising in those parts through the season of 1809, I went home to Surry, where I remained a few weeks, and returned back to Salisbury. On my way there, I made several stops in different places where I had before practised, to see my friends and to give information to those who made use of my medicine and practice. On my arrival at Salisbury, my friends informed me that Dr. French had been very busily employed in my absence, and that he and a Deacon Pecker, who was one of the grand jury, had been to Salem, to the court, and on their return had said that there had been a bill of indictment found against me for wilful murder. They advised me to go off, and keep out of the way; but I told them I should never do that; for if they had found a bill against me, the government must prove the charges, or I must be honorably acquitted. About ten o'clock at night Dr. French came to the place where I stopped, with a constable, and made me a prisoner in behalf of the commonwealth. I asked the constable to read the warrant, which he did; by this I found that Dr. French was the only complainant,

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and the justice who granted the warrant, ordered me before him to be examined the next morning. I was then taken by the constable to Dr. French's house, and keepers were placed over me to prevent me from escaping. While at his house and a prisoner, Dr. French took the opportunity to abuse and insult me in the most shameful manner that can be conceived of, without any provocation on my part. He continued his abuse to me till between two and three o'clock, when he took his horse and set out for Salem to get the indictment. After he was gone, I found on inquiry of the constable, that after he had been before the grand jury and caused me to be indicted, he came home before the bill was made out, and finding that I was at Salisbury, fearing I might be gone, and he should miss the chance of gratifying his malicious revenge against me, he went to a brother doctor, who was a justice of the peace, before whom he made oath, that he had probable ground to suspect, and did suspect, that I had with malice aforethought, murdered sundry persons in the course of the year past, whose names were unknown to the complainant; upon which a warrant was issued against me, and I was arrested as before stated, in order to detain and keep me in custody, till the indictment could be obtained.

In the morning I was brought before the said justice, and he not being ready to proceed in my examination, the court was adjourned till one o'clock; when I was again brought before him, and he said he could not try me until the complainant was present, and adjourned the court again till near night. The constable took me to his house in the mean time, and put me in a back room and left me alone, all of them leaving the house. When they came back, some of them asked me why I did not make my escape, which I might very easily have done out of a back window; but I told them that I stood in no fear of the consequence, having done nothing whereby I ought to be punished; that I was taken up as a malefactor, and was determined to be convicted as such, or honorably acquitted. Just before night, Dr. French arrived with a Sheriff, and ordered me to be delivered up by the constable to the Sheriff; and after Dr. French had again vented his spleen upon me by the most savage abuse that language could express, saying that I was a murderer, and that I had murdered fifty, and he could prove it; that I should be either hung or sent to the State prison for life, and he would do all in his power to have me convicted. I was then put in irons by the sheriff, and conveyed to the jail in Newburyport, and confined in a dungeon, with a man who had been convicted of an assault on a girl six years of age, and sentenced to solitary confinement for one year. He seemed to be glad of company; and reminded me of the old saying, that misery loves company. I was not allowed a chair or a table, and nothing but a miserable straw bunk on the floor, with one poor blanket which had never been washed. I was put into this prison on the 10th day of November, 1809; the weather was very cold, and no fire, and not even the light of the sun, or a candle; and to complete the whole, the filth ran from the upper rooms into our cell, and was so offensive that I was almost stifled with the smell. I tried to rest myself as well as I could, but got no sleep that night, for I felt something crawling over me, which caused an itching, and not knowing what the cause was, inquired of my fellow sufferer; he said that it was the lice, and that there was enough of them to shingle a meeting-house.

In the morning there was just light enough shone through the iron grates, to show the horror of my situation. My spirit and the justness of my cause prevented me from making any lamentation, and I bore my sufferings without complaint. At breakfast time I was called on through the grates to take our miserable breakfast;

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it consisted of an old tin pot of musty coffee, without sweetening or milk, and was so bad as to be unwholesome; with a tin pan containing a hard piece of Indian bread, and the nape of a fish, which was so hard I could not eat it. This had to serve us till three o'clock in the afternoon, when we had about an equal fare, which was all we had till the next morning. The next day Mr. Osgood came from Salisbury to see me, and on witnessing my miserable situation, he was so much affected, that he could scarcely speak. He brought me some provisions, which I was very glad to receive; and when I described to him my miserable lodgings, and the horrid place I was in, he wept like a child. He asked liberty of the jailor to furnish me with a bed, which was granted, and brought me one, and other things to make me more comfortable. The next day I wrote letters to my family, to Dr. Fuller, and to Judge Rice, stating to them my situation.

The bed which was brought me, I put on the old one, and allowed my fellow sufferer a part of it, for which he was very thankful. I had provisions enough brought me by my friends for us both, and I gave him what I did not want; the crusts and scraps that were left, his poor wife would come and beg, to carry to her starving children, who were dependent on her. Her situation and that of her husband were so much worse than mine, that it made me feel more reconciled to my fate; and I gave her all I could spare, besides making his condition much more comfortable, for which they expressed a great deal of gratitude.

In a few days after my confinement, Judge Rice came to see me, and brought with him a lawyer. On consulting upon the case, they advised me to petition to the Judges of the Supreme Court to hold a special court to try my cause; as there would be no court held by law, at which it could be tried, till the next fall, and as there could be no bail for an indictment for murder, I should have to lay in prison nearly a year, whether there was any thing against me or not. This was the policy of my enemies, thinking that they could keep me in prison a year, and in all probability I should not live that time; and their ends would be fully answered.

I sent on a petition agreeably to the advice of my friends, and Judge Rice undertook to attend to the business and do every thing to get the prayer of the petition granted. He followed the business up with great zeal, and did every thing that could be done to effect the object. I think he told me that he or the lawyer, Mr. Bartlett, had rode from Newburyport to Boston fifteen times in the course of three weeks, on the business. At length Judge Parsons agreed to hold a special court at Salem, on the 10th day of December, to try the cause, which was one month from the day I was committed. My friends were very attentive and zealous in my cause, and every preparation was made for the trial.

During this time the weather was very cold, and I suffered greatly from that cause, and likewise from the badness of the air in our miserable cell, so that I had not much life or ambition. Many of my friends came to see me, and some of them were permitted to come into the cell; but the air was so bad and the smell so offensive, that they could not stay long. My friend, Dr. Shephard, came to see me, and was admitted into our dungeon. He staid a short time, but said it was so offensive he must leave me; that he would not stay in that place a week for all Newburyport. On Thanksgiving Day we were taken out of our cell and put in a room in the upper story, with the other prisoners, and took supper together; they consisted of murderers, robbers, thieves, and poor debtors. All of us tried to enjoy our supper and be in as good spirits as our condition would permit. The most of their complaints were of the filthiness and bad condition of the prison, in

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which we all agreed. Before it was dark I and my companion were waited upon to our filthy den again. There was nothing in the room to sit upon higher than the thickness of our bed; and when I wrote any thing, I had to lay on my belly, in which situation I wrote the Medical Circular, and several other pieces, which were afterwards printed.

After I had been in prison about two weeks, my son-in-law came to see me. I had before my imprisonment sent for him to come to Portsmouth on some business, and on hearing of my being in prison, he immediately came to Newburyport to see me. He seemed much more troubled about my situation than I was myself. I felt perfectly conscious of my innocence and was satisfied that I had done nothing to merit such cruel treatment; therefore my mind was free from reproach; for I had pursued the course of duty, which I conceived was allotted me by my Maker, and done every thing in my power to benefit by fellow-creatures. These reflections supported me in my troubles and persecutions, and I was perfectly resigned to my fate.

About this time, a lawyer came into the prison and read to me the indictment, which was in the common form, that I, with malice aforethought, not having the fear of God before my eyes, but moved by the instigation of the devil, did kill and murder the said Lovett, with lobelia, a deadly poison, &c.; but feeling so perfectly innocent of the charges, which the bill alleged against me, it had very little effect upon my feelings; knowing them to be false, and that they had been brought against me by my enemies, without any provocation on my part.

In the morning of the day that was appointed for me to be removed to Salem for trial, I was taken out of my loathsome cell by the jailor, who gave me water to wash myself with, and I was permitted to take my breakfast by a fire, which was the first time I had seen any for thirty days, and could not bear to sit near it in consequence of its causing me to feel faint. As soon as I had eaten my breakfast, the iron shackles were brought and put on my hands, which I was obliged to wear till I got to Salem. The weather was very cold, and the going bad; we stopped but once on the way, the distance being about twenty-six miles. On our arrival, I was delivered over to the care of the keeper of the prison in Salem, and was confined in a room in the second story, which was more comfortable than the one I had left. I was soon informed that Judge Parsons was sick, and had put off my trial for ten days; so I had to reconcile myself to the idea of being confined ten days more without fire. However I was not without friends; Elder Bolles and Capt. Russell came to see me the first night, and Mrs. Russell sent her servant twice every day with warm coffee, and other things for my comfort, for which I have always been grateful; and Mrs. Perkins, whom I had cured of a dropsy, sent for my clothes to wash against the day of my trial.

Many of my friends came to Salem to attend my trial; some as witnesses, and others to afford me any assistance in their power. A few days before my trial, Judge Rice and Mr. Bartlett, whom I had employed as my lawyer, held a consultation with me, as to the arrangements necessary to be made; when it was decided that it would be best to have other counsel; and Mr. Story was agreed upon, who engaged in my cause. I had also engaged Mr. Bannister, of Newburyport, to assist in the trial; but he was of no benefit to me, and afterwards sued me for fifty dollars, at fifty miles distance, to put me to great expense. In order to be prepared for the trial, my counsel held a consultation together, and examined the principal witnesses in the defence. Mr. Bolles, Judge Rice, and several others gave great satisfaction as to the value and usefulness of the medicine, and the

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variety of cures that had been performed with it within their knowledge. Dr. Fuller, of Milford, N. H., was present and made many statements in my favor, as to the value of the medicine, and advised to have Dr. Cutler, of Hamilton, summoned, which was done. Every thing was done by my friends that was in their power, to assist me and give me a chance for a fair trial, for which I shall always feel very grateful.

On the 20th day of December, 1809, the Supreme Court convened to hear my trial, at which Judge Parsons presided, with Judges Sewall and Parker, assistant Judges. The case was called about ten o'clock in the morning, and the chief justice ordered me to be brought from the prison and arraigned at the bar for trial. I was waited on by two constables, one on my right and the other on my left, in which situation I was brought from the jail to the court-house and placed in the bar. The court-house was so crowded with the people, that it was with much difficulty we could get in. After I was placed in the criminal seat, a chair was handed me and I sat down to wait for further orders. Here I was the object for this great concourse of people to look at; some with pity, others with scorn. In a few minutes I was directed to rise and hold up my right hand, to hear the indictment read, which the grand jury had upon their oaths presented against me. It was in common form, stating that I had with malice aforethought, murdered Ezra Lovett, with lobelia, a deadly poison. I was then directed by the court to plead to the indictment, guilty, or not guilty; I plead not guilty, and the usual forms, in such cases, were passed through, the jury called and sworn, and the trial commenced.

The Solicitor General arose, and opened the case on the part of the Commonwealth, and made many hard statements against me, which he said he was about to prove; he stated that I had at sundry times killed my patients with the same poison. The first witness called to the stand, on the part of the government, was Mr. Lovett, the father of the young man that I was accused of killing. He made a tolerable fair statement of the affair in general, particularly of coming after me several times before I could attend; though I think he exaggerated many things against me, and told over several fictitious and ridiculous names, which people had given my medicine, by way of ridicule, such as bull-dog, ram-cat, screw-auger, and belly-my-grizzle; all of which had a tendency to prejudice the court and jury against me; and I also thought that he omitted to tell many things in my favor, that must have been within his knowledge; but there was nothing in his evidence that in the least criminated me, or supported the charges in the indictment.

The next witness called, was Dr. Howe, to prove that I had administered the poison alleged in the indictment. He stated that I gave the poison to the said Lovett, and produced a sample of it, which he said was the root of lobelia. The Judge asked him if he was positive that it was lobelia; he said he was, and that I called it coffee. The sample was handed round for the court to examine, and they all appeared to be afraid of it, and after they had all satisfied their curiosity, Judge Rice took it in his hand and ate it, which very much surprised them. The Solicitor General asked him if he meant to poison himself in presence of the court. He said it would not hurt him to eat a peck of it, which seemed to strike the court with astonishment. Dr. Howe was then called at my request for cross-examination, and Mr. Story asked him to describe lobelia, how it looked when growing, as he had sworn to it by the taste and smell. This seemed to put him to a stand, and after being speechless for several minutes, he

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said he had not seen any so long, he should not know it if he should see it at this time. This so completely contradicted and did away all that he had before stated, that he went off the stand quite cast down.

Dr. Cutler was called on to inform the court what the medicine was that Dr. Howe had declared so positively to be lobelia, and after examining it, he said that it appeared to him to be marsh-rosemary, which was the fact. So far, all they had proved against me was, that I had given the young man some marsh-rosemary, which Dr. Cutler had declared to be a good medicine.

Some young women were brought forward as witnesses, whom I had no knowledge of ever seeing before. They made some of the most absurd and ridiculous statements about the medicine, that they said I gave the young man, that were probably ever made in a court of justice before; some of which were too indecent to be here repeated. One of them said that I crowded my puke down his throat, and he cried murder till he died. This was well known to be a falsehood, and that the story was wholly made up by my enemies, as well as what had been before stated by those women, for the purpose of trying to make out something against me. I had two unimpeachable witnesses in court, ready to swear that I never saw the young man for more than fourteen hours before he died, during all which time he was in the care of Dr. Howe; but by not having an opportunity to make my defence, in consequence of the government not making out their case against me, could not bring them forward.

John Lemon was the next witness brought forward on the part of the Commonwealth, and was directed to state what he knew about the prisoner at the bar. He stated that he had been out of health for two years, being much troubled with a pain in his breast, and was so bad that he was unable to work; that he could get no help from the doctors; that he applied to me and I had cured him in one week; and that was all he knew about the prisoner at the bar. By this time Judge Parsons appeared to be out of patience, and said he wondered what they had for a grand jury, to find a bill on such evidence. The Solicitor General said he had more evidence which he wished to bring forward.

Dr. French was called, and as he had been the most busy actor in the whole business of getting me indicted, and had been the principal cause, by his own evidence, as I was informed, of the grand jury finding a bill against me, it was expected that his evidence now would be sufficient to condemn me at once; but it turned out like the rest, to amount to nothing. He was asked if he knew the prisoner at the bar; he said he did. He was then directed to state what he knew about him. He said the prisoner had practised in the part of the country where he lived, with good success; and his medicine was harmless, being gathered by the children for the use of the families. The Judge was about to charge the jury, when the Solicitor General arose and said, that if it was not proved to be murder, it might be found for manslaughter. The Judge said, you have nothing against the man, and again repeated that he wondered what they had for a grand jury.

In his charge to the jury, the Judge stated that the prisoner had broken no law, common or statute, and quoted Hale, who says, any person may administer medicine with an intention to do good; and if it has the contrary effect from his expectation, and kills the patient, it is not murder, nor even manslaughter. If doctors must risk the lives of their patients, who would practise? He quoted

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another clause of law from Blackstone, who says, where no malice is, no action lies.*

The charge being given to the jury, they retired for about five minutes, and returned into court and gave in their verdict of Not Guilty.

I was then honorably acquitted, without having had an opportunity to have my witnesses examined, by whom I expected to have proved the usefulness and importance of my discovery before a large assembly of people, by the testimony of about twenty-five creditable men, who were present at the trial; besides contradicting all the evidence produced against me. After the trial was over, I was invited to the Sun Tavern to supper, where we enjoyed ourselves for the evening. When we sat down to the table, several doctors were present, who were so offended at my being acquitted, that they left the table, which made me think of what the Scripture says, that "the wicked flee when no man pursueth, but the righteous are as bold as a lion."

During the evening, I consulted with my friends upon the subject of prosecuting Dr. French, and making him pay damages for his abuse to me when a prisoner at his house, in saying that I had murdered fifty, and he could prove it; and after having had a fair chance, and having failed to prove one, it was thought to be a favorable opportunity to make him pay something for his conduct towards me, in causing me so much suffering, and for the trouble he had made me and my friends. A prosecution was agreed upon, and to bring the action in the county of York. Judge Rice agreed to be my bail, and likewise he undertook to pay my lawyers and witnesses for the above trial, and paid Mr. Bartlett forty dollars that night. Mr. Story was paid twenty dollars by a contribution of my friends in Salem. I staid at Mrs. Russel's that night; I had but little sleep, for my mind was so much agitated, when I came to consider what I had gone through, and the risk I had run in escaping the snares of my enemies, with the anxiety of my family till they got the news of my acquittal, that sleep fled from my eyelids, and I was more confused than when in prison.

The next day I went to Salisbury, and stopped with Mr. Osgood, where I was first arrested. Mrs. Osgood and a young woman who had been employed by me as a nurse, assisted to clean my clothes, and clear me of some troublesome companions I had brought with me from the prison; and when I had paid a visit to all my old friends, who were very glad to see me, I went to Portsmouth, to recover my health, which was very much impaired, by being confined forty days in those filthy and cold prisons, in the coldest part of a remarkably cold winter. My friends attended upon me, and carried me through a regular course of medi-

* As the learned Judge could find no law, common or statute, to punish the accused, he directed or advised those present to stop this quackery, as he called it, and for this purpose, to petition the Legislature to make a law that should make it penal for all who should practise without license from some medical college; to debar them of law to collect their debts; and if it should not answer, to make it penal by fine and imprisonment.

This hint, thus given by the Judge, was seized upon first in Massachusetts; from thence it has spread to nearly all the States in the Union. From this source may be traced all those unconstitutional laws which have been enacted in relation to this subject, and all those vexatious suits which I have had to attend in many of the States, from Massachusetts to South Carolina, more or less almost every year since. But I have been able to break them down by my patent being from higher authority, which Judge Parsons could not prevent, or perhaps he never thought of. He however made his own report, and handed it to the reporter, which is published in the 6th volume of Massachusetts Reports, and is resorted to by all the enemies of the practice, for a defence against the system.

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cine; but the first operation of it had little effect, in consequence of my blood being so much chilled, and it was a long time before I could raise a perspiration that would hold. I am confident that I should not have lived through the winter in prison, and believe that this was their plan; for which reason they managed to have me indicted for murder; knowing in that case there could be no bail taken, and there would be no court at which I could be tried, for nearly a year, I should have to lay in prison during that time, and that I should probably die there; or in any case, they would get rid of me for one year at least, whether there was any thing proved against me or not; and in that time, the doctors and their dupes would be enabled to run down the credit of my medicine, and put my practice into disrepute among the people; but I have been able, by good fortune, and the kind assistance of my friends, to defeat all their plans.

Retribution.

Most of those who have been instrumental in trying to destroy me and my practice, have had some judgment befall them as a reward for their unjust persecutions and malicious conduct towards me. I was credibly informed that Deacon Pecker, one of the grand jury that found a bill against me, went with Dr. French, to hunt up evidence to come before himself, in order to have me indicted. A short time after I was put in prison, he had a stroke of the palsy, and has remained ever since, [1822,] one half of his body and limbs useless. Dr. French, one year after I was acquitted, was brought to the same bar in which I was placed, and convicted for robbing a grave yard of a dead body, which it was reported he sold for sixty dollars. He lost all his credit, and was obliged to quit his country.*

Again Invades Dr. French's Territory and Prosecutes Him for Damages, but Loses the Case.

In the month of January of 1810, I returned home to my family, and staid till I had in some measure recovered my loss of health by imprisonment. In March I returned to Portsmouth, and after taking the advice of my friends, made arrangements for prosecuting Dr. French. The prosecution was commenced, and he was summoned before the court of common pleas, in the County of York. Judge Rice undertook the principal management of the business, and became my bail. The action was called and carried to the Supreme Court by demurrer, which was to set at Alfred, in October. I attended with my witnesses, and expected to have gone to trial; and after waiting several days to know what the defence was going to be, the counsel for the defendant made their plea of justification. I found that their plan was to prove that I had murdered sundry persons whom I had attended, and by that means to make it out that any one had a right to call me a murderer; and that for this purpose, Dr. French had been to every place where I had practised, collecting every case of the death of any that I had attended in this part of the country, and had made out eight cases, all of which have been before mentioned in this narrative, most of whom had been given over by the doctors, as past cure, and the others known to be desperate cases. He had obtained the depositions of all that were prejudiced against me, and had collected a mass of evidence to support his defence. After finding what their plan was, it was thought necessary for me to go to all the places where they had been, and

* I do not pretend that these things followed on account of their treatment to me; but I only state them as matters of fact; for so it happened.

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get evidence to contradict these highly colored and exaggerated statements, and I was under the necessity of requesting a delay of the trial for one week, which was granted. I proceeded immediately, and took the depositions of those who were knowing to the facts; but found that these were not sufficient, and went again to Deerfield, and summoned two men to appear at court, and give their verbal testimony. When I had got ready to come to trial, the defendant was not ready, and got it put off to the next term, which would be holden at York the next year. In the spring, before the setting of the court, I went to the clerk's office to find what the depositions were that were filed against me; and the whole appeared to be a series of exaggerated statements, made by those who were governed by their prejudices, without having but very little, if any, knowledge of the facts, more than what they obtained by hearsay. This caused me to redouble my diligence to get witnesses to appear on the stand to contradict their testimony, on each case they had alleged against me.

On the day appointed for the trial, every thing was prepared on my part to have a fair hearing. Judge Parsons was on the bench, and seemed, as I thought, to be determined to have the case go against me; for he appeared to know every thing that was to be in the defence beforehand. I made out my case by proving the words uttered by the defendant, which were in my declaration. They then proceeded in the defence, to make out the eight cases of murder, which were alleged against me. The first was the case of a man by the name of Hubbard, of Eliot, who had been dead above two years, the particulars of which I have before stated. The witness brought to support this case, told a very lamentable and highly colored story; and I brought on the stand a very respectable witness, who completely contradicted the whole statement.

The next cases brought up, were the three children of Mr. Fulsom, of Deerfield, the particulars of which have been before related. A number of depositions were read, which the defendant had obtained of those that had been my enemies, and who knew nothing of the matter, more than hearsay reports among themselves. They gave a very highly colored account of my treatment of the children; so much so, that it would appear by their stories, that I had taken them in health, and had roasted them to death; never saying a word about the fifteen that I cured, some of which had been given over by the doctors. To rebut the evidence that was produced to prove that I had killed those children, I brought on to the stand, two respectable witnesses, who were knowing to all the circumstances, being present at the time of my attending the family. They gave a correct and particular account of all the circumstances as they took place; of the situation of the family when I first saw them, and the violence of the disorder; how the doctors had lost all their patients that had been attacked with the disorder before I came; with the number that I cured by my mode of practice; and that the doctors afterwards adopted my plan, and saved the lives of a number by it. The Judge interrupted them and read some of the depositions over again; but these witnesses stated that they were not true, and went on to give some of the particulars of the opposition I met with in my practice from those very persons, whose depositions had been read, when the Judge seemed put out, and attempted to stop them, saying they had said enough. They said that having sworn to tell the whole truth, they felt it their duty to do it.

They next brought on the case of a woman who had died at Beverly, that I attended, and with it the case of Ezra Lovett, whom I had been tried for murdering. I was very glad to have this case brought up again, as I wished to have

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an opportunity to prove all the facts relating to it, which I had been prevented from doing on my trial, in consequence of being acquitted without making any defence. The evidence brought forward to support this case, were the depositions of those who had testified against me on my trial at Salem; they were pretty near the same as then given. After those depositions were read, I called on to the stand Elder Williams and Mr. Raymond, who gave all the particulars of my attending upon the young man, as has been before related, which completely contradicted all the depositions they had read in the case. The Judge interrupted these witnesses, and read the deposition of the girl, who stated that I crowded my pukes down the patient's throat, and he cried murder till he died. They both positively testified, that there was not a word of it true; for when he died, and for twelve hours before, he was under the care of Dr. Howe, during which time I did not see him. As to the woman in Beverly, whom they tried to make out that I murdered, it was proved by these witnesses, that she was in a dying condition when I first saw her, and that I so stated it as my opinion at the time, and that my medicine would not help her.

The next case was that of Mrs. Lifford, who died at Salisbury, the particulars of which have been before given. The evidence brought to prove this case of murder, was the deposition of the woman who nursed her, and by whose neglect the patient took cold, after the medicine had a very favorable operation, and appearances were much in her favor; in consequence of which she had a relapse, and I could not produce any effect upon her by the medicine afterwards. This woman confessed at the time, that she was the only one to blame, and that no fault ought to be attached to me; but she afterwards was influenced by Dr. French to turn against me, and made threats that she would swear to any thing to injure me. After her deposition was read, I brought witnesses on the stand, who completely contradicted every thing contained in it; but the Judge read her deposition to the jury, and directed them to pay attention to that in preference to the witnesses on the stand.

The eighth and last case was that of the son of Thomas Neal, of Portsmouth, who was very violently attacked, and was attended by Dr. Cutter. I was called on at night to attend him, and thought there was a possibility of helping him; but the man with whom he lived, would not consent that I should do anything for him, and I went away, after telling them that he would be either worse or better before morning, and if he was worse he would die. I was called to visit him in the morning, and was informed that he was worse, and that his master had consented to have me attend upon him. I told his father it was undoubtedly too late; but he insisted upon it so much, I attended, and told them the chance was very small for doing him any good, as I considered it a desperate case. After being very hardly urged by his friends, I gave him some medicine, but it had no effect, and about sun-down he died. The doctor who attended him was brought forward to prove that I murdered the patient. If I recollect rightly, he swore that the patient had the dropsy in the brain, and that the disorder had turned, and he was in a fair way to recover; but I came and gave him my poison pukes, and killed him. I brought forward evidence who swore to the facts as I have above related them, and that the doctor would give no encouragement of helping the patient. The father of the young man gave his evidence, and stated that the son was in a dying situation when I gave him medicine; but the Judge interrupted him, and asked if he was a doctor, to which he answered no. He then

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said the doctor has stated that his disorder had turned, and he was getting better; are you going to contradict the doctor? and thus managed to do away his testimony.

I have thus given a brief sketch of the evidence in the eight cases, which were attempted to be proved as murder, in order to make out justification on the part of the defendant, with my defence to the same, in as correct a manner as I am able from memory; and am confident that every circumstance as I have related it, can be substantially proved by living witnesses. After the evidence was gone through, the lawyers on both sides made their pleas, making the case on my part as good and as bad as they could. The Judge then gave his charge to the jury, which was considered by those who heard it, to be the most prejudiced and partial one that had ever been heard before. He made use of every means to raise the passions of the jury, and turn them against me; stating that the defendant was completely justified in calling me a murderer, for if I was not guilty of wilful murder, it was barbarous ignorant murder; and he even abused my lawyers for taking up for me, saying that they ought to be paid in screw-augers and bull-dogs. The people that were present were very much disgusted at his conduct, and they expressed themselves very freely upon the subject. It was said by some, that our courts, instead of being courts of justice, had become courts of prejudice. One man said that he hoped Judge Parsons would never have another opportunity to sit on a cause; which prediction turned out true, for he soon after had a stroke of palsy, and as I am informed, died before the next court met. The jury brought in their verdict of justification on the part of the defendant, and throwed the whole cost on me, which amounted to about two thousand dollars.

When I found how the case was going to turn, I went to Portsmouth, and soon after made arrangements to pay the costs. Judge Rice was my bail, and undertook to pay all the bills that I had not paid at the time. On my settlement with him, I owed him six hundred dollars for money that he had advanced on my account; for which I had no way to secure him, but by giving him a mortgage on my farm; which I did, and it was put on record, and never known to any of my friends till I had paid it up. He charged nothing for all his time and trouble, through the whole of my persecutions and trials, for which, and for his kindness and friendship on all occasions, I shall ever consider myself under the greatest obligations.

Attesting to the Fact that the "Fashionable" Doctors and Thomson had not yet Buried the Hatchet.

About the first of June, 1811, I received a letter from Eastport, where I had been the fall before and shown some of my mode of practice. Some of the people in that place were so well satisfied with it, that seven men had subscribed their names to the letter, requesting me to come there and practise in the fevers, which prevailed in those parts. I left the care of my business at Portsmouth with Mr. Carpenter, my apprentice, and immediately took passage for Eastport, where I arrived about the middle of June. I was very gladly received by those who had wrote to me, and by those with whom I had become acquainted when there before. I agreed to practise under the protection of those who had sent for me, until I had convinced them of its utility, to which they consented, and promised me all the assistance in their power. I was soon called on to practise, and had all the most desperate cases that could be found, in all of which I met with very great success. The first cases I attended in presence of the committee, were five des-

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perate cases of consumption. These patients were all relieved in three weeks, and were all living this present year, (1831.) While attending these people, I was called upon to attend a young man on board a vessel, who had his foot bruised to pieces by a block falling from mast-head, weighing thirteen pounds. It being done five days before I saw him, it was mortified, and the whole body in convulsions. I took off three toes and set the fourth, and cured him in five weeks with the usual practice. While attending him, I had to pass a doctor's shop. A scythe was thrown at me, point first, about the distance of two rods. It passed between my feet without doing any injury. In consequence of this assault, I sent word to all the doctors who had opposed me, that for the politeness with which they had treated me, I would compensate them by taking off the burden of being called up at night, and thus breaking their rest, and would give them the chance of laying in bed until noon, without being disturbed by their patients.

Indicating that Notwithstanding His Protests, Thomson Believed in Witchcraft or some "Baffling" Influence Outside the Natural.

While practising here, I frequently heard of the abuse and scandal towards me and my practice, from Mrs. Lovett, the old woman before mentioned, as the nurse of her son's wife, whom I cured of the dropsy. This old woman was a singular character, and was called a witch by the people; I have no faith in these kind of things, yet her conduct, and certain circumstances that took place, were very extraordinary, and puzzled and astonished me more than any thing I had ever met with, and which I have never been able to account for to this day. Mr. Carpenter was attending a man, where this woman often visited, who had the consumption, and his child, which was sick and had fits. He came to me and said that the medicine he gave would not have its usual effect; that the emetic, instead of causing them to vomit, would make them choke and almost strangle. I attended them myself, and on giving the medicine, it would operate on the man, and not on the child at one time, and the next time on the child and not on him. Sometimes the child would lay in fits, for a whole night, and nothing would have any effect upon it; in the morning it would come out of them and appear to be bright and lively. I had never known the medicine to fail of producing some effect before, where the patient was not so far gone as not to have life enough left to build upon. I can give no reason for this strange circumstance, satisfactory to myself, or which would be thought reasonable by the readers. The old woman, before mentioned, was frequently in and out of the house where the man and child were, and seemed to be very much interested about them; when she was gone the child would frequently go into violent fits, and when I steamed it, it was said the old woman would be in great distress. It caused much conversation among the neighborhood; they believed it to be the power of witchcraft; and that the old woman had a control over the destinies of the man and child, and was determined to destroy them, in order to get her revenge on me. I have no belief in these things; but must confess that her strange conduct, and the extraordinary circumstances attending the whole affair, baffled me more than any thing I had ever met with before. I was unable to do anything for these two patients, except sometimes by a temporary relief. They continued to grow worse, and finding it not in my power to do them any good, I left them, and they both soon after died.

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Decides to "Patent" his System of "Thomsonian Treatment." The Famous Beginning of American Patent Medicines. (See note, page 37.)

When I had maturely considered the subject in all its bearings, and exercised my best abilities in devising some plan by which I could extricate myself from the dangers which threatened me on every hand; and to prevent those rights, which twenty years labor, with much suffering and great expense had given me a just claim to, from being wrested from me; I finally came to the conclusion that there was only one plan for me to pursue with any chance of success; and that was to go on to Washington, and obtain a patent for my discoveries; and put myself and medicine under the protection of the laws of my country, which would not only secure to me the exclusive right to my system and medicine, but would put me above the reach of the laws of any state.

After coming to the conclusion to go on to the seat of government and apply for a patent, made all necessary preparation for the journey, and started from Portsmouth on the 7th of February, and arrived at Washington on the 23d. The next day after my arrival, I waited on Capt. Nicholas Gilman, of Exeter, showed him my credentials, and asked his advice, what I must do to obtain my object. He said that he thought it could not be made explicit enough to combine the system and practice, without being too long; he however advised me to carry my petition to the patent office; which was then under the control of Mr. Monroe, Secretary of State. I went to the patent office and found that Dr. Thornton was the Clerk, and presented him my petition. He asked me many questions, and then said I must call again; I called again the next day, and he said the petition was not right; that I must specify the medicine, and what disorder it must be used in; he said that those medicines in general terms to cure every thing, was quackery; that I must particularly designate the medicine, and state how it must be used, and in what disease. I then waited on Martin Chittenden, late governor of Vermont, who was at Washington, and asked his assistance; he was from the same town where my father lived, and readily consented. We made out the specifications in as correct a manner as we could, and the next day I carried them to the patent office, and gave them to Dr. Thornton; he complained much about its being too short a system, and put me off once more. I applied again and asked him for my patent; but he said I had not got the botanic names for the articles, and referred me to Dr. Mitchell, of New York, who was in the House of Representatives. I applied to him, and requested him to give the botanic names to the articles mentioned in my petition. He wrote them, and I carried them to Dr. Thornton; but he was unable to read some of the names, one in particular; he said I must go again to Dr. Mitchell, and get him to give it in some other words, and not tell him that he could not read it. I went, and the doctor wrote the same word again, and then wrote, or "Snap-dragon;" which I carried to Dr. Thornton, and requested him to put in the patent my names, and record it for himself, snap-dragon, or any other name he chose. He then talked about sending me to Philadelphia, to Dr. Barton, to get his names.

I found he was determined to give me all the trouble he could, and if possible to defeat my getting a patent, and I intimated that I should go with my complaint to Mr. Monroe, upon which he seemed a little more disposed to grant my request, and said he would do without Dr. Barton's names. He then went to work to make out the patent, and when he came to the article of myrrh, he found much fault about that, and said it was good for nothing. I told him that I paid for the patent,

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and if it was good for nothing it was my loss. After much trouble, I got it made out according to my request, and the medicine to be used in fevers, colics, dysenteries and rheumatism; he then asked me if I wanted any additions, and I told him to add, "the three first numbers may be used in any other case to promote perspiration, or as an emetic," which he did. I then had to go to the treasury office and pay my money and bring him duplicate receipts. After all this trouble, I at length succeeded in obtaining my patent according to my request, which was completed and delivered to me on the third day of March, 1813.

Interviews the Celebrated Medical Authorities of that Date, Drs. Barton and Rush, of Whom He Speaks Highly.

The next day after I had completed my business was the day of inauguration of the President of the United States; and I had the curiosity to stay and see the ceremonies on that occasion. After the ceremonies were over I went to the stage office and found that the seats were all engaged for a fortnight; and was obliged to stay till the 13th before I could get a passage. I then took passage in the stage and came on to Philadelphia, where I remained several days for the purpose of seeing Drs. Rush and Barton, to confer with them upon the subject of introducing my system of practice to the world. I spent considerable time with Dr. Barton; but Dr. Rush was so much engaged, that I was unable to have but little conversation more than stating my business. He treated me with much politeness; and said that whatever Dr. Barton agreed to, he would give his consent, so that my business was chiefly with the latter gentleman. I asked him many questions concerning my system and patent, and requested his advice of the best mode of introducing it. He advised me to make friends of some celebrated doctors, and let them try the medicine, and give the public such recommendation of it as they should deem correct. I told him that I feared that if I should do so, they would take the discovery to themselves, and deprive me of all credit or benefit from my labors, and asked him if he thought that would not be the case. He said it might with some, but he thought there were some of the profession honorable enough not to do it. I asked him if he would make a trial of it himself, and give it such credit as he should find it to deserve. He said that if I would trust it in his hands, he should be pleased, and would do justice to me and the cause. I accordingly left some of the medicine with him, with directions how to use it; but before I received any return from him, he died; and Dr. Rush also died some time previous; by which means I was deprived of the influence of these two men, which I was confident would otherwise have been exerted in my favor.

Thomson in an Interview with Barton Criticises the Prevalent Medical Treatment and Points Out the Absurdity of Bleeding to Cure Disease. "It appeared to me very extraordinary to bleed twenty times to cure the most fatal disease ever known; the same manner of treatment would kill one-half of those in health."

During my interviews with Dr. Barton, we had much conversation upon the subject of the medical skill, and he being quite sociable and pleasant, I expressed myself very freely upon the fashionable mode of practice, used by the physicians of the present day. He acknowledged there was no art or science so uncultivated as that of medicine. I stated to him pretty fully my opinion of the absurdity of bleeding to cure disease; and pointed out its inconsistency, inasmuch as the same method was made use of to cure a sick man as to kill a well beast. He laughed and said it was strange logic enough.

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While in the city of Philadelphia, I examined into their mode of treating the yellow fever; and found to my astonishment that the treatment prescribed by Dr. Rush was to bleed twice a day for ten days. It appeared to me very extraordinary to bleed twenty times to cure the most fatal disease ever known; and am confident that the same manner of treatment would kill one half of those in health. This absurd practice being followed by the more ignorant class of the faculty, merely because it has been recommended in some particular cases by a great man, has, I have not the least doubt, destroyed more lives than has ever been killed by powder and ball in this country in the same time. Those I met in the streets, who had escaped the fatal effect of bleeding, mercury, and other poisons, carried death in their countenance; and on conversing with them, they said they had never been well since they had the fever; that they took so much mercury and opium, they were afraid that they were in a decline.

After a Series of Journeys, Introducing His "System," Establishing Agencies, and Selling Patent Rights to His System of Practice, Thomson is again Disappointed in Financial Affairs.

This season I went to Eastport, and collected some money to pay my friend Rice; and thinking to make some profit, laid it out in fish, and sent it to Portland, consigned to my friend Fickett. When I went there myself, sold the fish to him. I afterwards made a settlement with him, and took his note for one hundred and sixty-three dollars, which he agreed to pay Judge Rice; as he was going to Boston in a short time, and he would call on him at Portsmouth for that purpose. I then went home to see my family, and in about six months after, returned to Portsmouth, and on calling on Judge Rice, found to my surprise that Mr. Fickett had not paid the money, that he had failed, and there was no chance for me to get any thing of him. So I was again disappointed in my expectations of paying this demand, and it appeared to me that all my hard earnings would be sacrificed to pay the expense of persecutions; but my friend Rice was very indulgent; and instead of complaining, did all he could to encourage me and keep up my spirits.

Meets a Disaster that "Was Taken Advantage of by His Enemies."

In 1814 returned to Portsmouth, which place I made the principal depot of my medicines; having previous to my returning from the Eastward, made arrangements with my agents to supply them, and all others who had purchased the rights, with such medicine as they might want, by their applying to me for them. I had laid in a large stock, the value of which I estimated to be about one thousand dollars. I went to Boston and Salem, to procure some articles that could not be obtained elsewhere, in order to complete my stock; when absent, the great fire took place at Portsmouth, and all my stock of medicine was consumed. This was a very serious loss to me, not only in a pecuniary point of view, but it disarranged all my plans, and put it out of my power to supply those who I knew depended upon me for all such articles as were most important in the practice. The season was so far advanced that it was impossible to obtain a new recruit of most of the articles; and I was obliged to collect a part of what had been sent to different places, in order to be able to supply, in the best manner I could, such demands for medicine, as I should be called on for. In doing this, I was put to great trouble and expense, and in order to make myself whole, was under the necessity of raising the price of the medicine fifty per cent.; this caused much grumbling and complaint from the members of the societies in different places, and was taken advantage of by my enemies to injure me all they could.

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Concerning Two Remedies and Further Trouble with Infringers on His Patented System of Medication.

After staying in Washington a few days, we went to Alexandria where we remained about a week, in which time I collected some cyprus bark, which is known there by the name of poplar, and what we call poplar, is by them called quaking-aspen, on account of the constant shaking of its leaves.

During this summer, I visited Eastport, Portland, Charlestown, South Reading and other places where societies had been formed, or rights sold to individuals, to give information to the people; and in all places where I went, found the book of directions, which had been clandestinely obtained and published by the doctors and others, to injure me by stopping the sale of rights, selling at 37½ cents. I was under the necessity of putting an advertisement in the papers, cautioning the people against this imposition, which put a stop to their sale; but great pains were taken by my enemies to circulate them among the people; and this is the way that some of my articles of medicine came to be made use of through the country in colds, such as cayenne, ginger, &c. In 1815 I published another edition of my book of directions, and secured the copy right; but this was reprinted at Taunton, and I advertised it as before, and stopped its progress.

Marsh Rosemary Becomes Scarce, but Thomson finds that it is "Too Cold and Binding."

In the fall of the year 1815, I went to Cape Cod to procure some marsh-rosemary, and collected a quantity, carried it to Portsmouth and prepared it for use. This is the last time I have collected any of this article, and as it becomes scarce, think I shall make no more use of it. It is too cold and binding, without using a large share of bayberry bark and cayenne with it, to keep the saliva free. I have found other articles as substitutes, which answer a better purpose, such as hemlock bark, which I have of late made use of and found very good, white lily roots, witch-hazel and raspberry leaves, and sumach berries; the last article is very good alone, steeped and sweetened, and is as pleasant as wine; it is good for children in cases of canker, especially in long cases of sickness when other articles become disagreeable to them.

Thomson Experienced Much Trouble with Persons Who Bought His "System Rights." Ever in a Turmoil, He Decides at last that Whoever "Purchases a Right for Himself and Family is Entitled to All the Privileges."

I formed those who purchased the rights, into a society; and they chose a committee, whom I authorized as agents to sell rights and medicine; but this caused a jealousy among the rest of the members, who said I gave privileges to some more than to others.

I have formed four societies, and given them certain privileges, by allowing them part of the profits on the sale of rights and medicine; but as soon as there was any funds, it has always created uneasiness among the members. Some of the ignorant and selfish, would call for their dividends, as though it was bank stock, instead of feeling grateful for the advantages they enjoy by having their diseases cured, and their minds relieved from the alarming consequences of a disease, with a trifling expense. I have since altered my plan, and now have but one society. Every one who purchases a right for himself and family, becomes a member of the Friendly Botanic Society, and is entitled to all the privileges of a free intercourse with each other, and to converse with any one who has

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bought a right, for instruction and assistance in sickness, as each one is bound to give his assistance, by advice or otherwise, when called on by a member. In this way much more good can be done, and there will be much more good-will towards each other, than where there is any money depending.

In the Decline of Life, Disconsolate and Disappointed at Men's Ingratitude, Thomson Concludes to Appoint a "Suitable Agent" to Care for his Business. He Selects Elias Smith.

After having discovered a system, and by much labor and constant perseverance reduced it to practice, in a manner that had given general satisfaction to all who had become acquainted with it, and having secured the same by patent, in order that I might reap some benefit from my discovery, to support me in my old age, having by a long series of attendance on the sick, both as physician and nurse, become almost worn out, I came to the determination to appoint some suitable person, who would do justice to me and the cause, as a general agent, to take the lead in practice, and give the necessary information to those who should purchase the rights, which would enable me to retire from practice and receive a share of the profits as a reward for my long sufferings. After considerable inquiry, I became acquainted with Elias Smith, who was recommended as a man in whom I could confide, and who was every way qualified as a suitable person to engage in the undertaking. I found him in Boston, and in very poor circumstances; having been for many years a public preacher, but in consequence of his often changing his religious principles and engaging in different projects in which he had been unsuccessful, he was now without a society or any visible means of supporting himself and family. He readily engaged with me, and promised to do every thing in his power, to promote my interest and extend the usefulness of my system of practice.

I sold him a family right in December, 1816, and was in his family during the winter, for the purpose of instructing him in the practice, to qualify him to attend upon the sick and give information to others. I put the utmost confidence in his honor, and spared no pains in communicating to him, without any reserve whatever, all the knowledge I had gained by my experience, both by practice and verbal instruction; under the expectation, that when he became sufficiently acquainted with the system and practice, I should be rewarded for my trouble, by his faithfully performing his duty towards me, according to his promise. I shall make no remark upon my being disappointed in all my expectations in regard to Mr. Smith's conduct, and the treatment I received from him after he had gained a knowledge of the practice from me, to enable him to set up for himself; but shall proceed to give a short account of what took place during my connection with him.

Comes now a Series of Troubles in which Smith and Thomson Disagree, and, as usual, Thomson Becomes an Enemy of His Friend.

In the winter of 1819, I went to Philadelphia, and previous to my going made arrangements with Mr. Smith to publish a new edition of my book of directions; we revised the former edition, and made such additions as we thought would be necessary to give a complete and full description of my system, and the manner of preparing and using the medicine; and I directed him to secure the copy-right according to law. I left the whole care with him, to arrange the matter, and have it printed. On my return to Boston in March, he had got it done; but in a manner

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very unsatisfactory to me, for he had left out twelve pages of the most useful part of the remarks and directions, and it was otherwise very incorrectly and badly printed. I asked him the reason of this, and he said a part of the copy had got mislaid, and the printer had not done his work well. I had no idea at the time, that he had any design in having this pamphlet printed in the manner it was; but his subsequent conduct would justify the belief that he had previous to this, formed a plan to usurp the whole of my system of practice, and turn every thing to his own advantage; for he has since attempted to satisfy the public, that my system was no system; and has brought forward this very book, which was printed under his own inspection, and arranged by him, as a part of his proof, that I was incapable of managing my own discoveries, and of communicating the necessary information in an intelligible manner to make my system of practice useful to those who purchased the rights. It is a well known fact, that some of the most essential parts of the directions were to be verbal; and I had allowed him ten dollars each, to give the proper instructions to all those to whom he sold the rights.

Another circumstance that I have recently found out, goes to show a dishonesty in design, to say the least of it. He deposited the title page of the above mentioned pamphlet, and obtained a certificate from the clerk, in the name of Elias Smith, as proprietor, and caused it to be printed in the name of Samuel Thomson, as author and proprietor. What his intentions were in thus publishing a false certificate, I shall not attempt to explain; but leave the reader to judge for himself.

Smith, now in Open Rebellion, Publishes a Book that Conflicts with Thomson's Exclusive Right to the "System."

In May, 1820, Mr. Smith collected together those in Boston who had bought rights of me or my agents, and formed them into a society, under a new name; he wrote a constitution, which they signed; and the members paid one dollar entrance, and were to pay twelve and a half cents per month assessment, for which he promised them important instructions and cheap medicine. He was appointed president and treasurer, and after he had obtained their money, the meetings were discontinued, and the society was broken up in the course of nine months. In this he appears to have taken the lead of all those who had purchased the right of me, and make them tributary to himself.

In November, I returned from the country and found that he had advertised, without my knowledge or consent, in the Herald, a periodical work published by him at that time, "proposals for publishing by subscription, a book to contain the whole of the system and practice discovered by Samuel Thomson, and secured to him by patent. The price to subscribers to be five dollars. By Elias Smith." This mostly stopped the sale of rights, for no one would purchase a right of me or my agents at twenty dollars, when they had the promise of them at five. I went to him to know what he meant by his conduct, in issuing these proposals; he plead innocence, and said he had no improper design in doing it.

Thomson and Smith Now Separate.

I was now under the necessity of doing something in order to counteract what had been done by Mr. Smith, in publishing the above proposals; and came to the determination to issue new proposals for publishing a narrative of my life as far as related to my practice, with a complete description of my system of practice in curing disease, and the manner of preparing and using the medicine secured to me

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by patent; the price to subscribers to be ten dollars, including the right to each of using the same for himself and family. Mr. Smith undertook to write the proposals and get them printed; after they were struck off, I found he had said in them, by Samuel Thomson and Elias Smith; all subscribers to be returned to the latter. I asked him what he meant by putting his name with mine; he said in order to get more subscribers. I said no more about it at that time, and let them be distributed.

When I settled with him the last time, I asked him what he would charge me to prepare my manuscript for the press; he said he thought we were to write it together; I asked him what made him think so; he said because his name was on the proposals with mine; I admitted this; but told him the reasons he had assigned for putting his name to it without my consent or knowledge. He then intimated that he thought he was to be a partner with me; I asked him what I ever had of him to entitle him to an equal right to all my discoveries. To this he made no reply; but said he would write it, and we would agree upon a price afterwards. I told him no; I must know his price first. He said he could not tell within fifty dollars. I then told him we would say no more about it. This conversation, together with his conduct in regard to the proposals, convinced me beyond all doubt, that his design was to destroy me, and take the whole business to himself. I felt unwilling to trust him any longer, and took all my books and manuscripts from his house.

Thomson Enters Suit for Infringement of Patent, to find it "Improperly Made Out."

He continued to practise and prepare medicine, bidding me defiance. I made several attempts to get an honorable settlement with him, without success. I employed three persons to go to him and offer to settle all our difficulties by leaving them to a reference; but he refused to do any thing, continued to trespass, and made use of every means to destroy my character by abusive and false reports concerning my conduct, both in regard to my practice and private character. Finding that I could get no redress from him, I put an advertisement in the papers, giving notice that I had deprived him of all authority as my agent; and cautioning the public against receiving any medicine or information from him under any authority of mine. He redoubled his diligence in trespassing, and prepared the medicine and advertised it for sale under different names from what I had called it. I found there was no other way for me to do, but to appeal to the laws of my country for justice, and brought an action against him for a trespass on my patent, to be tried at the Circuit Court, at the October term, 1821. The action was continued to May term, when it was called up, and the Judge decided that the specifications in my patent were improperly made out, not being sufficiently explicit to found my action upon. In consequence of which I had to become non-suited, and stop all further proceedings against him, till I could make out new specifications and obtain a new patent from the government.

Closes the "Narrative of the Life of Samuel Thomson" with a Bitter Complaint Concerning Man's Ingratitude.

Mr. Smith has lately [1822] published a book in which he has given my system of practice with directions for preparing and using the vegetable medicine secured to me by patent, and my plan of treatment in curing disease as far as he knew it. In the whole of this work there is not one principle laid down or one idea suggested, except what is taken from other authors, but what he has obtained from my written or verbal instructions; and still he has the effrontery to publish it to the world as

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his own discovery, without giving me any credit whatever, except he has condescended to say that "Samuel Thomson has made some imperfect discoveries of disease and medicine, but has not reduced any thing to a regular system." This assertion will appear so perfectly ridiculous to all those who have any knowledge of my practice, that I shall forbear making any comment upon it. It is true that he has made alterations in the names of some of the preparations of medicine, but the articles used, and the manner of using them, are the same as mine. It is also a well known fact, that he had no knowledge of medicine, or of curing disease, until I instructed him; and if what he says be true, the effect has been very remarkable, in as much as his magnetical attraction has drawn all the skill from me to himself, by which he has taken upon himself the title of Physician, and left me nothing but the appellation of Mr. Thomson, the imperfect projector.

I have been more particular in describing Mr. Smith's conduct, because it has been an important crisis in the grand plan for which I have spent a great part of my life, and suffered much, to bring about; that of establishing a system of medical practice, whereby the people of this highly favored country may have a knowledge of the means by which they can at all times relieve themselves from the diseases incident to our country, by a perfectly safe and simple treatment, and thereby relieve themselves from a heavy expense, as well as the often dangerous consequences arising from the employing those who make use of poisonous drugs and other means, by which they cause more disease than they cure; and in which I consider the public as well as myself have a deep interest. I have endeavored to make a correct and faithful statement of his conduct, and the treatment I have received from him; every particular of which can be substantiated by indisputable testimony if necessary. I now appeal to the public, and more particularly to all who have benefited by my discoveries, for their aid and countenance, in supporting my just rights against all encroachments, and securing to me my claims to whatever of merit or distinction I am honorably and justly entitled. While I assure them that I am not to be discouraged or diverted from my grand object by opposition, or the dishonesty of those who deal deceitfully with me; but shall persevere in all honorable and fair measures to accomplish what my life has principally been spent in fulfilling.

ADDITIONS IN THE SECOND EDITION. 1825.

Proceeds to Take Legal Evidence with the Object of Preventing Infringement of His "Patent," which had been Issued January 28th, 1823.

After having failed in my attempt to obtain justice, by prosecuting Elias Smith for trespass, as has been before related, I found it necessary to adopt some new plan of procedure, in order to meet the universal opposition I have in all cases met with from not only the medical faculty, but from all those who belong to what are called the learned professions. When I obtained my patent, I had good legal advice in making out the specifications, besides, it was examined and approved by the Attorney General of the United States; and it was said at the time of the trial, by several gentlemen learned in the law, to be good; and that the very nature and meaning of the patent was, that the compounding and using the articles specified in manner therein set forth, was what I claimed as my invention.

There was, however, no other way for me to do, but to obtain another patent; and immediately after the above decision, I set about getting one that would meet the objections that had been made to the first. In making new specifications, I had the assistance of several gentlemen of the law, and others, and every precaution was taken to have them according to law; but whether my second patent will be

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more successful than the first, time must determine. It embraces the six numbers, composition or vegetable powders, nerve powder, and the application of steam to raise perspiration; and to put my claim beyond doubt, I added at the end as follows, viz.: "The preparing and compounding the foregoing vegetable medicines, in manner as herein described, and the administering them to cure disease, as herein mentioned, together with the use of steam to produce perspiration, I claim as my own invention." My second patent is dated January 23, 1823.

Enters Suit Against Elias Smith for Commission Money Due on Patents, Wins His Suit, and Rejoices in his Victory.

At the time I failed in my attempt against Elias Smith, in consequence of the decision against the correctness of the specifications of my patent, as has been before related, I had a number of notes for rights sold, among them were two against a person, who had previously expressed great zeal in my cause, for a right for himself, and one for his friend. During the pending of the trial, he took sides with Smith; and after the decision, came to the conclusion, or, as I suppose, was told by Smith, that the notes could not be collected by law, and refused to pay them. I did not wish to put him to cost, and therefore let the business rest, in hopes he would think better of it and pay me according to contract; but after waiting until the notes were nearly outlawed, and he still refusing to pay, I put one of them in suit, and the action was tried before the Boston Police Court. The defence set up was, that the contract was void, in consequence of the failure of the patent; and also that there was no value received.

The trial was before Mr. Justice Orne, and was managed by Mr. Morse, for the plaintiff, and Mr. Merrill, for the defendant. On this trial, as on all others in which I have been engaged, there seemed to be the same fixed prejudice against me and my system of practice. The Judge took several days to make up his judgment, and finally decided in my favor, giving me the full amount of my claim; thus settling the principle, that obligations given for family rights were good in law. This was the first time I have ever had a chance to prove the utility of my medicine and system of practice, before a court of law; having always before been prevented by some management of the court.

A writer has lately come forward and published a series of numbers in the Boston Patriot, under the title of "Eclectic," who appears well qualified, and seems disposed to do me and my system of practice justice, by laying before the people a correct view of my case.

ADDITIONS IN THE THIRD EDITION. 1831.

Appoints an Agent, John Locke, Who Turns Traitor and Unexpectedly Involves Thomson in Morgan's Masonic Controversy.

In all this time, I had never thought or mistrusted that there was a plot laid against me, either by him (Locke), my agent, or the committee, or with all combined, nor until about the end of the second year, which now seems but too obvious. Having recently returned from the West, I was at Mr. Locke's house, and showed him a newspaper which contained an account of the masonic outrage at Batavia. After reading it, he flew into a great passion, and accosted me as though I had made the story. I tried to argue the case with him; but in vain. He called me by as many hard names as he could well think of, and occasionally, the words "lie," and "fool," were in the compound.

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Another Agent, House, Now Refused to Pay his Commission.

I have tried repeatedly to get a settlement with Col. House, my principal agent, but cannot effect it. He has paid me nothing for the large number of rights sold in about ten years, nor will he render any account. I know not how many books he has sold, as he took them whenever he wanted, in my absence. When I called on him last to settle, he said he had lost his account of credit. Here is the result of ten years agency! Besides which, I lent him and his partner, ten years ago, two hundred dollars, one of which he has paid in printing, the other he refuses to pay. I might mention many other circumstances which would go to show a decided hostility against me, and a determination to raise Mr. Locke, if possible at my expense; but I forbear, for they have neither built him up, nor put me down. I have paid no attention to all this opposition; but have kept on in a straight forward course, attending to the preparing of good medicine and supplying all those who wished for it.

Describes His Travels and Troubles, Tells of Counterfeit Books and Agents' Concerns.

Since my last edition was printed in Boston, I have been six times in and through the State of Ohio. In the year 1825, I appointed Charles Miles, as agent in Ohio, and furnished him with seventy-two books for family rights. On his way home he purchased a number of counterfeit books, of David Rogers, of Geneva, I understood about one hundred, more or less. He went down into the central part of the State, and in the course of eighteen months sold about ten thousand dollars worth of rights, and imposed on the inhabitants at a great rate. Some he sold for seventy-five dollars, some twenty-five, others twelve, and he would leave but one book for four rights. When he came round again, he would borrow my book and leave the other, and sell my book again to another set of four or five; and so continued until he had sold all mine, and nearly all the others. In the fall of 1826, Horton Howard caused a letter to be sent to me, giving an account of Miles's conduct, and requesting me to come on to see about it. I arrived in January, 1827, and, following after Miles, I found his conduct to be as had been stated. I published handbills, and otherwise showing that he had no authority from me to do as he had done. I revoked his agency, and pacified the rage of the people as well as I could, by restoring the family right to those to whom he had so improperly sold it, and besides this, I lost a great part of what he owed me.

Horton Howard, of Ohio, Prints Books, Sells Patent Rights to Thomson's Treatment and Keeps the Money, about \$80,000.

In January of the same year, I made Horton Howard agent for the Western country, with authority to print my book, and in three and a half years, he had printed about six thousand copies, and sold about four thousand rights, with the assistance of his sub-agents, amounting in all to about eighty thousand dollars. I tried at several different times to come to an honorable settlement with him, until August, 1830, at which time he utterly refused to give me an account from beginning. I then had but one alternative, either to bring an action against him in the court of chancery, or else take what he was willing to give. I chose the latter, by which I sacrificed about seven-eighths of what should have been coming to me. I took his notes for four thousand dollars, in two annual payments, two thousand dollars each year. I revoked his agency in two days afterwards, August 9, 1830, and ap-

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pointed four other agents in his stead, and took about two thousand copies of books, and left them with my other agents.

Reform Medical College Started in New York City and Another in Worthington, Ohio.* This Thomson considers "Villainous."

But the dernier resort of the doctors will be to get my practice into their own hands, and under their own management, if possible. Finding that I should succeed in my Bontanic practice, certain individuals of them have set up what they call a reformed college, in New York, where they have adopted my practice as far as they could obtain a knowledge of it from those who had bought the right of me, and would forfeit their word and honor to give them instruction. And finding that the Botanic practice gained very fast at the West, they have established a branch of their reformed college in Worthington, Ohio. I saw Dr. Steel, last winter, who is the President of that Institution, I was introduced to him by Mr. Sealy, a member of the Senate, and Dr. Steel was introduced to me as President of said college. I asked him if he was President of that reform which was stolen from Thomson, in New York. This seemed to strike him dumb on the subject. At the same place, a few evenings after, I was introduced to one of the practitioners under this reform, who studied and was educated at the college in New York, and was one of the instructors at Worthington. I asked him if he ever saw any of my books in the college in New York. He said he had accidentally seen one there. I replied, then you accidentally confess that my books were studied in that college. I then asked him whether they used the lobelia. He said they did. I then named the cayenne, rheumatic drops, bayberry and nerve powders. He confessed they used them all in manner and form, as I had laid down in my books. I am, therefore, satisfied that if my medicine were taken from them, their Institution would not be worth one cent. But, to have bought the right, would have been too mean for such dignitaries; but, to steal it from a *quack*, was, perhaps, in their estimation, much more honorable!!! Every honest man who hears any of the doctors speak of those colleges with approbation, ought to upbraid them with these facts.

Sums Up and Closes His Narrative by Consoling Himself in that the Result of his Trials and Persecutions has been a Blessing to Humanity. Relates that He Has a Stock of Golden Seal and Madagascar Cayenne, and calls Attention to the Gross Adulations in Commercial or "American Cayenne."

Thus I have given a few prominent items, though but a small proportion of my experience, sufferings, perplexities and difficulties, since the second edition of this work was published. But much of that which operated to my disadvantage, as an individual, served to extend the knowledge and practice of the system. This gives me consolation in the midst of all my trials; and considering the Botanical practice as being now well established, I think it is for me to retire from the field of contest and war with either learned ignorance or legal opposition.

I have collected about three hundred weight of the golden seal the year past, and a large quantity of cayenne from the island of Madagascar; nearly three tons. I have sent to the southern States nearly twenty barrels, floured, which is a great help in the agues of that country.

And here it is proper to remark, that great impositions are practised on what

* This, in 1845, was moved to Cincinnati, Ohio, its name changed to "The Eclectic Medical Institute." From that date to the present it has been uninterruptedly continuous and usually prosperous. (See Felter's History of the Eclectic Medical Institute.)

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is called the American cayenne. The doctors have declared it to be poison, and destructive to health, and I think they have made it as bad as they have represented it to be. It appears to be mixed with some red paint or mineral. When burnt, it leaves about two-thirds of the quantity, of the blackest substance. When taken inwardly, it produces violent vomiting, and ought to be shunned as a mad dog. There is but little or none sold at the groceries for ordinary purposes but of this kind. The only safe way to detect the poison, is to try it by burning. If it be pure, there will be a proportion of ashes as of other vegetables, and of a light color; if it be bad, the ashes will not only be black, but there will be double, and perhaps triple or quadruple the quantity there should be for the quantity burnt.

NOTICE.

I hereby appoint ABNER KNEELAND, editor of the Boston Investigator, Agent, generally, but not exclusively, throughout the United States, to receive and answer my letters, to sell the Rights to my Botanical System of Practice in Medicine, and my Books containing a Narrative of my Life and System of Practice, and to attend to all matters and things expressed or implied in the above agency, especially during my absence, the same as I should or could do if present, and the agencies of E. G. House and John Locke, are hereby revoked. SAMUEL THOMSON.

TO THE PUBLIC.

THE Subscriber having been appointed Agent for Dr. SAMUEL THOMSON, as above stated, all letters intended for the Doctor, may be addressed either to him or to the Subscriber, as all the Doctor's letters come into the box of the Investigator, and of course into the hands of the Subscriber, who will keep Family Rights, with the Books containing the System of Practice, constantly for sale at the Investigator Office; and who will appoint sub-agents, with the advice and consent of the Doctor, when, and wherever they shall be thought necessary, and will also keep the Medicine for sale at the same prices, and as low as it can be bought of the Patentee, and the patronage in this line, which the public are disposed to give, will be gratefully received by the public's obedient servant,

ABNER KNEELAND.

I will here relate an anecdote, which may be of use to some. At the time of my taking up my first large hive, we asked some neighbors in, to eat honey. I gave away about one hundred weight of honey, with biscuit and butter answerable. Before the season came round, I bought a few pounds in presence of one of the men who partook most liberally of the bounty. He asked, "Have you got rid of all your honey?" I replied, "Yes." "Why," said he, "you should not have been such a fool as to have given it all away." Here I made a notch in my memory. The next fall I took up my bees, and carried honey enough to Walpole, to fetch ten dollars. This I thought better than to be twitted for giving it away. However, in the course of the fall, I was in company with the same man; he asked, "Have you taken up your bees?" "Yes," was the answer. He rejoined, "And did you ask in the neighbors to eat honey?" My answer was, "No; I carried it to Walpole and sold it." He replied, "Why, they say you are a *hog* for not asking them."

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I replied, "You have learned me a lesson, which I had not thought of; when I gave my honey all away, I was a *fool*; and when I kept it, I was a *hog*; therefore, unless I am a hog at least half of the time, I cannot live." The conclusion is this. When a man begins the world, if he means to escape censure, he must observe a proper medium between being a *hog* and a *fool*, in the estimation of his neighbors, but if he has any thing which to them will be as sweet as honey, he must not keep all, nor give all away.—[A specimen of Thomson's philosophy.]

Now, reader, just take a general survey of the calamities of the world. The condition of a great portion of mankind is truly deplorable, and has been ever since the healing art was lost, and the plants and herbs of the field and forest ceased to be used as medicine; and since poison minerals of the rankest dye were substituted in their stead by Paracelsus, who in consequence was called a *hater of mankind*. Dr. Robinson says, "Paracelsus gave the tartrate of antimony, because it burnt up the stomach and lungs like hell fire." If this expression be true, I think it sufficient to prove the truth of his being a hater of mankind. In addition to this physic dealer and hater of mankind, comes Sydenham, who introduced bleeding to cure disease. These two plagues being joined in matrimony, against the life and health of mankind, I think, have caused the greatest plagues that ever infested the earth. The writer says that after Sydenham introduced bleeding into the practice of physic, in the space of one hundred years, "more died with the lancet alone, than all that perished by war in that time."—[A specimen of Thomson's opinion of "Fashionable Medicine" and its effects.]

WHO DISCOVERED AND INTRODUCED LOBELIA?

[Benjamin Waterhouse, M. D., Professor of the Theory and Practice of
Medicine, Cambridge University, Discourses on
Thomson and His Crusade.]

The record of plain-spoken Samuel Thomson, his aggressive exposures of the evil results of orthodox medication, his persistent attacks on individuals who practiced medicine "by authority," together with the facts concerning it all so potent at that date to the people at large, led to the tremendous rebellion against cruelty to the sick, that for half a century swept over America. Not all the legalized medical profession, however, were Thomson's antagonists, nor were they all unfriendly to his cause. The talented Dr. Manasseh Cutler, as has been shown, testified in his behalf, and the scholarly Professor Tully, M. D., of Yale, believed in kindly American remedies instead of the vicious heroics that authoritatively then prevailed.

In this direction the celebrated Professor Benjamin Waterhouse, M. D., Professor of the Theory and Practice of Medicine, Cambridge University, openly advocated the recognition of Thomson and pleaded that credit be given him both for his efforts and for his discoveries. With a view of presenting this side of the question fairly, we append to the narrative a few letters by Dr. Waterhouse that properly are by reference connected therewith. In addition, they have a historical bearing on the question of "Who discovered and introduced lobelia." These letters also enter into the subject of *Quackery*, which Dr. Waterhouse defines, to Thomson's credit.

To the Editor of the Boston Courier:

I have lately read, with considerable interest and some surprise, a little volume of nearly 200 pages, entitled, "A Narrative of the Life and Medical Discoveries of Samuel Thomson, containing an account of his System of Practice, and manner of Curing Diseases with Vegetable Medicines upon a Plan entirely New;" to which is added his New Guide to Health, containing the principles upon which the system is founded.

While reading the book, I said to those who recommended it to my perusal, this man is no "Quack." He narrates his medical discoveries, gives an account of his system of practice, together with his manner of curing diseases, upon a plan confessedly new; to which he adds the principles on which his new system is founded. He who does this is no Charlatan, but by uniting theory to practice, merits atten-

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tion. With these ideas of cultivation and promulgation of human knowledge, I read the narrative of Samuel Thomson, and soon perceived that he was a man of good capacity, persevering temper, and benevolent disposition; and then he acquired his knowledge of the hitherto unknown virtues of certain plants by experiments, first on himself, and then on those about him. In the course of twenty or thirty years, he arranged his experimental knowledge into a system, as did the father of physic before him, however imperfect; and, having done this to the best of his power, (for he had no literary education,) he published the result of his experience, labor and thoughts to the world, for it to judge of them and of him.

Auto Biography is a profitable species of writing to the world, but dangerous to the writer himself, especially if a professional man, or a political partizan; before he can gain credit for one honorable motive, every sinister object that can be imagined will be laid to his account. Who, among his competitors, will exercise that impartiality on hearing his story, which they require of him in relating it? Narrow minded jealousy will pervert everything. We may allow for a little high coloring in controversy with rivals—very few physicians or divines are free from it; but if Samuel Thomson, in the narrative of his life, has not turned aside from facts, he has been unjustly treated, and, in some instances, most cruelly persecuted. He has given names, dates, places and events, and spoken of judges, sheriffs, jailors and witnesses, in a style so plain as to exclude equivocation; and the same of a noted preacher. If what he said of them be false, he ought to be exposed and publicly punished; if true, he merits protection. His discoveries, are valuable or insignificant; his practices, a nuisance or a benefit; his writings, useful, or a tissue of lies and calumnies; his Patent, honorable, or a disgrace to our government; and it is not beneath the dignity of any physician, divine, or philosopher, to inquire into the truth of a series of experiments published with so much confidence, and purporting to be for the benefit of mankind.

I have no doubt that Samuel Thomson has added a very valuable article to the *Materia Medica*, and that he has again and again relieved the sick where others have failed. From all that I can recollect, I am induced to believe that he is not an avaricious man, but one who is more flattered by success in relieving the sick than in receiving their money. This at least, entitles him to a fair and patient hearing. It is possible he may have deceived himself, but it does not appear that he has laid himself out like a conjurer, to deceive others. If this man has devoted the greater part of his life to the relief of his fellow-men, his labors claim respect, and his errors our indulgence; for who of us are free from them? Let the unprejudiced man, who reads his *Narrative and Guide to Health*, judge for himself; but should he boggle at his theory of heat and cold, let him remember that Thomson, without knowing it, has adopted a theory of Galen; and his idea of the preserving power of nature, the curer of disease and preserver of life, appears to be the same as that acknowledged by Hippocrates; but the writer could not express it in Greek.

Thomson is not a Quack, if by quack, we mean a vain, artful, tricking practitioner in physic. He is an Experimenter, who accumulates knowledge by his own experience. There was a sect among the ancients who assumed the appellation to distinguish themselves from dogmatists, who, without experience taught dogmas. If Samuel Thomson be a quack, he is a quack *sui generis*, for being an enemy to concealment, he tells all he knows in as plain a manner as he possibly can, and leaves you to form your own judgment, provided you divest yourself of the fashion of this world in physic, which, with priestcraft, is fast passing away.

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Read the book, men of New England, and after making due allowance for the author's condition, situation and provocations, judge whether such a man merits the persecution he has endured, and the treatment he has met with.

BENJAMIN WATERHOUSE.

Cambridge, Dec. 8, 1835.

To Samuel Thomson, Botanic Practitioner of Medicine.

Dear Sir:—To the questions put to me yesterday, I answer, that I remain firm in the opinion that you were the discoverer of the remarkable virtues of the *Lobelia inflata*, as a safe emetic, and other rare qualities in effectually deterring the stomach and intestines of foul and morbid matter—a prime object in the removal of all disorders consequent on imperfect digestion. The efficacy and safety of the vegetable I have had ample and repeated proofs of in a number of cases, and in my own person, and have reason to value it equal to any article in our *Materia Medica*.

That you yourself were the originator of this compound process, very extensively known under the title of the Thomsonian Practice or System, I have no doubt whatever. I mean the uniting the warm bath, with the thorough cleansing of the whole alimentary canal. I value and recommend it on this account. It effects in three or four days, what we regular physicians use to occupy as many weeks to accomplish. As a public teacher of the practice of physic, I have told my pupils for nearly half a century, past, that when they have learned how to restore the long impaired organs of digestion to their pristine or natural state, they have acquired two-thirds of their profession; and on that simple principle is based the whole doctrine of my printed lecture on the pernicious effect of smoking cigars, and the inordinate use of ardent spirits.

Furthermore: the regular physician finds it necessary sometimes to make a great change in the human frame, or to make a very strong counter irritation, so as to obliterate the morbid or destructive one. This used to be done by quicksilver, that is, mercury, in the various preparations; when pushed to a salivation it dilapidates, if we may so speak, or dissolves the human fluids, all of which are made up of globules, or round particles, on the crisis of which depends the vital integrity of our bodies, and of course, our health and vigor. After the hazardous process of salivation, the physician may, perhaps, be able to say, Now I have so far changed the morbid state of the patient, that his disease is conquered, and entirely overcome by the powerful operation of the mercury. But then in what condition does he find the sufferer? His teeth are loosened, his joints are weakened, his healthy condition is impaired, his voice is more feeble, and he is more susceptible of cold, and a damp state of the weather. His original disorder is, to be sure, overcome; but it is paying a great price for it. Secret history conceals from public notice innumerable victims of this sort.

Now, my sagacious, industrious, and much-respected Empiric, or Eclectic, if you like the latter term better, let us come to the point you seem to aim at, namely, my opinion on the whole.

I consider a man laboring under a chronic disease of some time standing, who has passed through one, two, three, (as the case may be) of your processes of the *lobelia emetic*, to be as much altered as the man who has gone through the very disagreeable and dangerous operation of mercurial salivation; and, if so, your discovery is highly valuable, and on this account it was that I spoke freely and strongly in commendation of the new practice, and was not afraid nor ashamed

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to hail you as a Reformer, and to give you full credit, and, in this view, I have always considered you as standing on higher ground than Paracelsus, who was born in 1493.

As to the point of your originality, I will sum it up in as few words as I can—I regard you as a Tree, the root and trunk, of the Lobelia and vapor bath system conjoined; its limbs your immediate agents, and its leaves and fruit, the purchasers of the rights and privileges—all deriving their value from the Tree of knowledge; and, having said this, I have performed a grateful office, and I may add, to all around me, and remain, and hope ever to remain,

Your steady friend,

BENJAMIN WATERHOUSE.

Dr. Thomson was indicted before Chief Justice Parsons, for poisoning with lobelia, but the charge was of so frivolous a character that he was discharged without being put upon his defence. Here the affair should have rested; but Judge Parsons, to gratify a malicious disposition, made out a garbled report of the case, calculated to injure Dr. Thomson, and reflect discredit upon his system; and this report has now grown into a precedent, and is cited by the old faculty to prove that the Thomsonian remedies are pernicious. It was not known for many years that Parsons was the author of this report—no one suspecting him of such an act of baseness—but it was ultimately discovered by Col. House who addressed a letter to Mr. Tyng on the subject, and received the following answer, which is now in the possession of Dr. Waterhouse:

Cambridge, 11th Dec., 1835.

Dear Sir:—I have found the letter of Col. House. This is the copy of it, viz:—

Newburyport, 17th October, 1825.

"Sir:—Yours of yesterday came to hand by this morning's mail. In answer to your inquiry, I have to inform you, that the late Chief Justice Parsons compiled the report of the case of the Commonwealth vs. Thomson, and handed it to me, precisely in the words published, soon after the term of the court at which the case was tried.

"Your ob't. servant,

"DUDLEY A. TYNG.

"E. G. House, Esq., Boston."

The original is at your service, whenever you shall find it needful.

Were the case mine, (as much as I lament this lawsuit,) I should insist on your adverse lawyer to define Quackery—call on him to explain etymologically the derivation and origin of the word,—insist on his drawing the line where quackery ends, the proud science begins. Let your attorney tell his opponent that if Samuel Thomson was a quack, Hippocrates and all the Greek physicians were quacks, and all the Jewish ones also; and every Roman physician, not only through the entire Roman republic, but down through all the Roman emperors, and all the first ages of Christianity, and down through all the dark ages, and still long after the revival of letters of Italy. Prior to 1400 there were no regular schools of anatomy, and the science of chemistry was unknown, until the Arabians brought the medicinal chemistry into use. The art and practice of physic was the result of experience, and

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was a collection of facts delivered verbally from father to son, and from tutor to pupil.

Anterior to 1745, the study and practice of physic was very little variant, if any, from what Samuel Thomson, the Patriarch of the lobelia and steam system, has by great pains and labor accumulated during more than forty years of an industrious life. The most solid, immovable, and valuable portion of our art, is derived from experience; and the best qualification of it is sagacity, and the next to that is industry,—all of which the Patriarch, Samuel Thomson, possesses eminently. The scientific physician follows, and copies the rules of others, and that constitutes the learned physician; but Samuel Thomson studies the Book of Nature,—that is, the nature of man, and everything about him, as did the famous physicians among the ancients, and some of the best and most successful among the moderns.

Samuel Thomson restricts his means of cure to the vegetable kingdom, and rejects entirely the mineral one, all except water. I will not dispute with him. Let him stick to his system, and let us regulars profit by it, and in return it would enlarge his own useful knowledge. I confess I have learned several valuable things from his many experiments, and his severe scrutiny into the nature, qualities, and medicinal virtues of our own native plants.

I rank Samuel Thomson among discoverers, and respect him as such. He is not an imposter. He has an uncommon stock of natural knowledge, and enjoys the benefit of his discoveries and trials by the security of a patent. The vast West has been benefited by them, and they have been, in some degree, tributaries to him. I who introduced vaccination into America, in 1799, distributed the blessings everywhere in this new world, disclosed everything, and kept nothing back; but sacrificed my practice, and even my medical professorship, to that great discovery by which one of the greatest plagues that ever afflicted human nature, has been drawn from the condition of man. I never disputed, except in one instance, with any man or body of men, but gave to the public all my pains and labor. I beat the bush, but never laid myself out to catch the bird. I have the honor, others the profit—while others are unhappy in disputes and unprofitable contentions, I do not repent of my forbearance.

In one thing every thinking man must and will agree; for it admits of no dispute. It will be admitted as an axiom, namely—The Thomsonian practice has been diffused through New England between fifteen and twenty years, and still maintains its credit; and every year its roots strike deeper, and its branches spread wider and wider. Now make any man of due reflection believe that such a practice could have spread so wide among such a discerning, inquisitive people as we of New England certainly are, without having discovered its nothingness,—its worse than nothingness,—its vain and nonsensical pretensions. The thing is impossible. If the lobelia had been proved a worthless plant, it would have been years ago, "thrown like a lonesome weed away." On the contrary, I had rather be without that very nauseous powder, ipecac, which makes me spit while I write, than to be deprived of the more agreeable and efficacious Lobelia.

We import Ipecacuanha from South America, and sometimes use it after it has been a dozen or twenty years out of the ground, whereas we can cultivate the Lobelia in our own gardens, and pick it up in our own fields. I not only prescribe it to others, but I take it myself whenever I have any occasion for an emetic. I value it equally with the Peruvian bark, or with rhubarb, jalap or senna or any other medicinal plant you can mention. Instead of Lobelia, it ought in justice, in honor, and in gratitude, to be called Thomsonian emetica.

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But the discovery of the medicinal qualities of this indigenous plant, is not the sole merit or felicity of Samuel Thomson. His vapor-bath process, to which the Lobelia is the Prodomos, (or, in plain English, file-leader, or fore-runner,) is, taken together, a very valuable improvement in our practice, if conducted by persons as experienced and as sagacious as the Patriarch Thomson.

In England, Parliament would probably have purchased the procedure by a liberal grant. In France, at least under the old regime, the King would have bought it. But we, wiser than any of them, have only tried to pick it to pieces. Still I consider it a valuable anchor, the emblem of Hope, to which is attached a firm cable, that numbers have been trying in vain to pick to oakum; but which will, I trust, be like the strongly twisted cord that binds our happy States together, acquiring strength by age.

To weigh Patriarch Thomson in the scales of the regular physician would be as unjust as for them to be weighed by his steel-yards. They practice on different principles, feelings and views—each honest in his respective path of art and nature. They both will come out in the same road at last, and travel on together to the Temple of honor and profit.

Samuel Thomson, like most reformers, has endured in our county of Essex as much severe persecution as ever was perpetrated in it; which is saying a great deal, when we call to mind the days of the delusion of Witchcraft. Though capitally indicted for murder by using Lobelia, he was discharged without a trial, after something like a reprimand of the Solicitor-General by the Court. Yet it is remarkable that Chief-Justice Parsons deemed it worth while to write the report of it in the VI. Vol. of Tyng's collections.

I feel diffident and doubtful whether I have said too much or too little on a subject that will increase in importance with time. Reformers—originators, and exterminators of loathsome and shocking diseases, are always considered as benefactors of the whole human race—not merely those who are living, but of those who shall live after us, as long as letters and other records shall endure.

BENJ. WATERHOUSE.

Letter to Samuel L. Mitchell, M. D., L.L. D., of the city of New York:

Cambridge, Dec. 19th, 1825.

My Dear Sir:—Dr. Samuel Thomson, who has the honor of introducing the valuable Lobelia into use, and fully proved its efficacy and safety, will deliver you this. He has cured and relieved many disorders which others could not, without being a regular diplomatized physician, and dared to be a republican in a hot bed of federalism; for which he has been shamefully ill-treated, even to persecution.

I have aided and assisted Thomson from a firm belief that his novel practice has been beneficial to numbers, and that it may be placed among improvements. If he be a quack, he is a quack *sui generis*, for he proclaims his mode and means.—Had John Hunter, whom I knew well, been born and bred where Samuel Thomson was, he would have been just such another man, and had S. T. been thrown into the same society and associations as J. H. he would, in my opinion, have been his equal, with probably a wider range of thought; both are men of talents and originality of thought.

I am, indeed, so disgusted with learned quackery, that I take some interest in honest, humane and strong-minded empiricism; for it has done more for our art, in all ages and in all countries, than all the universities since the times of

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Charlemagne. Where, for goodness sake, did Hippocrates study?—air, earth, and water—man, his kindred—vegetable; disease and death, and all casualties and concomitants of humanity, were the pages he studied—every thing that surrounds and nourishes us, were the objects of his attention and study. In a word, he read diligently and sagaciously, the Great Book of Nature, instead of the little books of man as Thomson has.

How came your Legislature to pass so unconstitutional an act as that called the antiquack law? such as the Parliament of England would hardly have ventured on; for who will define quackery? Were I sufficiently acquainted with your Governor Clinton, I would write to him on the subject. You New-Yorkers are half a century behind us in theological science, but your quack bill looks as if you halted also in physic.

By what I have seen and learnt of Mr. Thomson, I wish him success, and the notice of the eminent and the liberal in the profession; and with these views I give him this rapidly-written letter to you, and am with a high degree of esteem and respect, his steady friend,

BENJ. WATERHOUSE.

To Samuel Thomson, Boston.

To the Editor of the Boston Courier:

I read in one of your late papers an article entitled, *The Battle of Doctors*, purporting to have been contested at Baltimore on Lyceum ground. The account seemed chiefly serious, but partly ludicrous. But as it related to the very serious subject of health and disease, or, in other words, life and death, I could not drive the narrative out of my mind. The practice of physic, I am bold to say, admits of great reform; yet it is no joke, and is really a subject worthy of the utmost attention of the people, and I have often reflected with surprise that it has been left at such loose ends in this state, where we scrutinize and find fault with every thing, and every profession, excepting that on which our comfort depends; for what are riches without health to enjoy them?

It seems that the Lyceum question was whether the Thomsonian practice ought to be encouraged? Now this includes another question, viz:—whether regular physicians ought to encourage it, or the people? If I mistake not, more than a million people in the United States have already answered the question and said—Let it be encouraged.

There arose a serious question in my mind—a question of honor and conscience, namely, ought I be silent on the solemn subject, or to give my opinion. I have determined on the latter; and that because I have received a considerable number of letters from Maryland, and further south, on the same subject, and as I have received some loaded with postage, the writers may receive the trifling value of my opinion without a cent's expense to them or me.

With due submission to that privileged body of physicians denominated through courtesy, the faculty, I should place Samuel Thomson among the reformers of the healing art.

The famous Galen dictated the laws of medicine full fourteen years after his death, by his, then, matchless writings. After the revival of letters, Paracelsus, who was born, 1493, in Switzerland, appeared as a reformer of the system of Galen. He was learned in Latin, Greek, and several other languages, and of respectable connexions. He first introduced mercury, (quicksilver,) antimony and

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opium into the *Materia Medica*; but he was arrogant, vain and profligate, and after living the life of a vagabond, died a confirmed sot. He studied mystery, and wrapped up his knowledge in terms of his own invention, so as to keep his knowledge confined to himself and a few chosen followers. The very reverse of Thomson, who performs numberless cures, and makes no secret of the means. The cant phrase of "Quack" belongs to the learned Paracelsus; but not to the mystery-hating Thomson, who considers mystery and roguery offsprings of the same father—the man of sin—the old father of lies and deception. If Thomson be a quack, he is a quack *sui generis*, or a cheat of a new and singular class.

BENJAMIN WATERHOUSE.

The following letter was written just before Dr. Thomson went to Washington to obtain his last patent:

To Samuel Thomson, Botanic Practitioner of Medicine.

Cambridge, March 26th, 1836.

Dear Sir:—In answer to your last letter, I would remark, that I continue to receive, from diverse quarters of our country, anxious inquiries with regard to my opinion of you, and your practice: to which I have uniformly said, that, as far as I know, you were the first person who discovered the remarkable medicinal virtues of the *Lobelia inflata*, even before you knew its systematic name, and called it the emetic weed; and that in consequence of the evidence adduced of its value, as a medicine, you obtained a patent for it, when the Hon. John Quincy Adams was Secretary of State, in which you were aided by the late Dr. Mitchell, and Dr. Thornton. Since then you have spread its value through a great part of the United States, and in a great degree silenced your opponents.

I have as little hesitation in saying, that I consider your joining to its exhibition the vapor bath, as a matter of no small importance, when carefully conducted by persons of sound judgment, and competent experience. I have entire confidence in the safety of the lobelia, and in the whole process, when conducted by the patriarch of the science, Samuel Thomson himself; for the practice is so far from being a trifling one, that I consider it in a class of Herculean remedies.

I wish the regular physician had a better opinion of the Thomsonian discoveries in the vegetable kingdom, and that the empiric practitioners had a better opinion of the regular or scientific physician. The conduct of Hippocrates is a bright example for both. Experience must be enlightened by reason and theory built upon close and accurate observation. The happy union of the two will form the consummate physician; while the desire of gain, and the ambition of celebrity, may injure both. You, my benevolent sir, have lived long enough in the world to be convinced how slowly beneficial discoveries are received and patronized, by the people, when they think that fame and fortune are the predominant motives of the discoverer.

Should it happen, that in your business at Washington, this letter should fall under the eye of that great and good man, Hon. John Quincy Adams, he will, at once, recognize the hand-writing of his old friend and correspondent.

BENJAMIN WATERHOUSE.

The foregoing letters and the friendship of many other talented men, neither allayed the antagonism that existed between Thomson and the Regular Medical Profession, nor prevented ignorant and ill-advised

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people from abusing therapeutic privileges and opportunities. In the name of Thomson, men and women, including statesmen, clergymen and scholars throughout America, repelled by the horrors of regular medication, but yet ignorant both of diseases and of the action of remedies, proclaimed themselves qualified to practice medicine by Thomson's Patent Right. The fanaticism and audacity of inexperience possessed them, but yet, necessity demanded that legalized persecution of the sick be circumvented. Among these Thomsonian enthusiasts was one whose trial became of National consequence; second only was it to that of his leader, Samuel Thomson, and as such needs be made a part of this record. From it we produce enough of the salient features, to clearly indicate not only its legal phases but to supply additional evidence concerning the rebellion of the people who had now by reason of the cruelty and viciousness of authoritative medicine, become aggressive protesters against the methods of the medical profession of America. This trial was celebrated as "The Trial of Dr. Frost."

TRIAL OF DR. FROST,
BEFORE THE COURT OF SESSIONS
FOR THE CITY AND COUNTY OF NEW YORK,
FOR MANSLAUGHTER,
ALLEGED TO HAVE BEEN COMMITTED ON TIBERIUS G. FRENCH
BY THE ADMINISTRATION OF CERTAIN

THOMSONIAN REMEDIES.

TO WHICH ARE ADDED THE SPEECHES OF
JOHN A. MORRILL AND DAVID PAUL BROWN, ESQRS.

FOR THE DEFENSE.

WITH AN APPENDIX.

Containing comments on the testimony, a history of the disgraceful conduct of the medical faculty during the trial, an affidavit exhibiting the baseness of Dr. Cheeseman; affidavits proving that one of the jurors was resolved upon the conviction of Dr. Frost, regardless of his oath or the evidence; a list of persons who died under treatment by the medical faculty; certificates of cures by the Thomsonian Treatment; letters of the Celebrated Professor Waterhouse of the Thomsonian System; and other matter of interest and importance.

PHILADELPHIA:
PUBLISHED BY A COMMITTEE OF THOMSONIANS.
1838.

THE TRIAL OF DR. FROST

In the height of Dr. Samuel Thomson's fame, came the "Trial of Dr. R. K. Frost," of New York, who, in 1837, was arrested for murdering Tiberius G. French by means of a Thomsonian course in Lobelia.

Dr. Frost conducted an infirmary in Howard Street, New York, to which French was taken for treatment. His death, the arrest of Dr. Frost, and the subsequent trial, made a tremendous sensation in both professional and lay circles throughout the entire country. Excitement ran high, engendering bitterness and vituperation second only to that bred by the celebrated Masonic Morgan incident. This trial occupied three full days in which an exceptional array of experts testified for and against the accused, among these being the celebrated Dr. Wooster Beach, the founder of Eclecticism, and antagonist of Thomson, but yet a strenuous opponent of the methods of the "Regulars."

An account of this trial, reported in full, in 1838, was published in pamphlet form by "A Committee of Thomsonians." It is very rare, but one copy existing to our knowledge, this being bound in "The Lobelia Advocate," a serial publication by Rev. John Rose, Baltimore, 1838 and 1839, of which also, no other than the Lloyd Library volume is known to us.

The aforesaid pamphlet, "Trial of Dr. Frost," together with comments, covers 104 pages. (See title-page, page 65.)

The quaint, almost grotesque indictment against Dr. Frost, is as follows:

City and County of New York, ss.

The jurors of the people of the state of New York, in and for the city and county of New York, on their oaths present that Richard K. Frost of the said city, not having the fear of God before his eyes, but moved and instigated by the devil, on the tenth day of October, in the year of our Lord one thousand eight hundred and thirty-seven, at the city and county aforesaid, with force and arms in and upon one Tiberius G. French, in the grace of God and the said people, then and there being feloniously and willfully did make an assault and feloniously and willfully did then and there administer unto and cause to be received by the said Tiberius G. French into the body and bowels of him, the said Tiberius G. French, a certain noxious and injurious clyster, which said clyster before that time, to wit: on the day and year aforesaid at the city aforesaid, had been prepared of various noxious and injurious and dangerous ingredients, that is to say of cayenne pepper and lobelia, by the said Richard K. Frost, and that he, the said Richard K. Frost did then and there feloniously and willfully administer unto the

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said Tiberius G. French, and did then and there feloniously and willfully apply unto and upon the breast, stomach, belly, and back, head, legs and arms of him, the said Tiberius G. French, a certain noxious and injurious hot vapor called steam, and did then and there feloniously and willfully keep and detain the said Tiberius G. French, under the application and action of the noxious and injurious hot vapor called steam, for a long space of time, to wit: for the space of three hours, and did then and there and whilst the said Tiberius G. French was under the application and vapor of the hot vapor aforesaid, feloniously and willfully administer unto and did then and there feloniously and willfully cause to be swallowed by him, the said Tiberius G. French, a certain noxious and injurious drug or herb, to wit: lobelia, and that he, the said Richard K. Frost, by administering the clyster aforesaid, the hot vapor aforesaid, called steam, and the injurious drug or herb aforesaid, did then and there cause and procure the said Tiberius G. French to become mortally sick and diseased in his body, and of which said mortal sickness and disease in his body he, the said Tiberius G. French, then and there died.

And so the jurors aforesaid upon their oaths do say and present that the said Richard K. Frost, in manner and form and by the means aforesaid, he the said Tiberius G. French, did then and there feloniously and willfully kill, contrary to the form of the statute in such case made and provided, and against the peace of the people of the state of New York and their dignity.

And the jurors aforesaid, upon their oaths aforesaid, do further present that the said Richard K. Frost, late of the city of New York, not having the fear of God before his eyes, but being moved and seduced by the instigation of the Devil, on the tenth day of October, in the year one thousand eight hundred and thirty-seven, with force and arms at the city aforesaid, in and upon one Tiberius G. French, in the peace of God and of the state then and there being, feloniously and willfully did make an assault and did then and there feloniously and willfully administer unto the said Tiberius G. French, and did then and there feloniously and willfully apply unto and upon the breast, stomach, belly, back, head, arms and legs of him, the said Tiberius G. French, a certain noxious and injurious hot vapor called steam, and then and there did feloniously and willfully keep and detain the said Tiberius G. French under the application and action of the noxious and injurious hot vapor aforesaid called steam, for a long space of time, to-wit: for the space of three hours, and that the said Richard K. Frost by administering and applying the aforesaid hot vapor called steam, as aforesaid, did then and there feloniously and willfully produce and cause a mortal congestion of the organs of him the said Tiberius G. French, of which said congestion of the organs of him the said Tiberius G. French, he the said Tiberius G. French then and there died. And so the jurors aforesaid, upon their oaths aforesaid, do say and present that the said Richard K. Frost in manner and form and by the means aforesaid, him the said Tiberius G. French did then and there feloniously and willfully kill contrary to the form of the statute in such case made and provided and against the peace, government and dignity of the state.

And the jurors aforesaid, upon their oaths aforesaid, do say and present that the said Richard K. Frost of the city of New York aforesaid, not having the fear of God before his eyes, but being moved and seduced by the instigation of the Devil, on the tenth day of October in the year of our Lord one thousand eight hundred and thirty-seven, with force and arms at the said city and county of New York aforesaid, in and upon one Tiberius G. French in the peace of God and of

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the said people then and there being feloniously, wickedly and willfully did make an assault and did then and there feloniously, wickedly and willfully administer unto and cause or procure to be swallowed by him, the said Tiberius G. French aforesaid, a certain tincture, infusion, decoction or tea of the poisonous, noxious and deleterious drug or herb aforesaid, called lobelia, and did also administer or cause and procure to be administered unto the said Tiberius G. French aforesaid, and did cause or procure to be swallowed by the said Tiberius G. French, certain pills, composed of noxious, deleterious and poisonous ingredients, of which said pills the noxious and poisonous herb or drug aforesaid to wit: lobelia, was part and parcel, together with other noxious, poisonous and deleterious drugs, herbs and ingredients unknown, by means of the taking of which said pills and tincture, decoction, infusion or tea aforesaid, into the stomach and bowels of the said Tiberius G. French, became mortally sick and then and there died.

And so the jurors aforesaid upon their oaths aforesaid do say that the said Richard K. Frost in manner and form said and by the means aforesaid by him, the said Tiberius G. French did then and there feloniously, willfully and wickedly kill contrary to the form of the statute in such case made and provided, and against the people of the state of New York and their dignity.

The introduction of the trial and opening for the prosecution was as follows:

This extraordinary trial, in which the medical faculty were arrayed against the Thomsonians, commenced before the Court of Sessions, for the city and county of New York, on Wednesday, December 13, 1837.

Present, Recorder Riker, and Aldermen Acker and Taylor.

Counsel for the prosecution, Mr. Phenix, District Attorney, and Mr. Griffin.

For the accused, John A. Morrill, Esq., of New York, and David Paul Brown, Esq., of Philadelphia.

The Court opened at 12 o'clock, and after the usual preliminaries, (the reading of the indictment excepted,) the following jury was empannelled:

John Jackson,	Joseph Wildey,
John D. Meyers,	James E. Wood,
Smith Dunning,	Nathaniel Mead,
Abel Price,	Mahlon Chichester,
Samuel Van Saun,	Charles B. Mease,
John Roshore,	Samuel M'Clintock.

Mr. Phenix proceeded to open the cause for the prosecution. He spoke of it as one of vital importance to the community. He said that the accused stood indicted for the crime of manslaughter—that he had been complained of for taking away the life of Tiberius G. French, a very promising and valuable young man, who was not greatly afflicted with disease—that the accused had no medical education, and was entirely ignorant of the nature and operation of remedial agents—that he had woefully abused the confidence of the deceased by giving him deleterious herbs which no reasonable man would administer to a dog—that he had put him into a vapour bath and administered poisonous concoctions of lobelia, together with pills and clysters—that the deceased had died in five days after he put himself under the treatment of Dr. Frost—that he felt it his duty to urge a conviction of manslaughter, in order that an example might be made of the accused.

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Mr. Phenix read from the Revised Statutes of New York, explaining to the jury what was to be understood by the term manslaughter, adding, that it would be for them to say in what degree the accused should be found guilty. The examination of witnesses commenced.

The brother of the victim, testified concerning the treatment as follows:

Ulysses D. French, Sworn. The deceased was my brother. He died on the 10th of October last. He was at my office on Thursday, the 5th of October; he had been complaining a day or two previous of a cold, said he felt chilly, and had a pain in his head. I am an Attorney at Law, 54 Howard Street; my brother was a Student with me, and a Teacher in the Grammar School of Columbia College. He was between eighteen and nineteen years of age. He placed himself under R. K. Frost, who is at the head of Thomson Infirmary in Howard Street. He went to the Infirmary on Thursday, October 5th at seven, P. M. I called on my brother the following day, (Friday,) at about seven in the evening; called next day, (Saturday) a little before dark; and again at nine o'clock P. M., in company with Dr. Davids; my brother was in the room where the vapor bath is administered; he complained of pain, had fever, and vomited much during the day. Drs. Frost and Davids were present; my brother had taken a course—can't say what particular medicine was taken. Dr. Frost said that he had given a lobelia emetic, which vomited powerfully. Dr. Frost said the disease was a cold which he could break up in a day or two. He told us also that he had given the deceased a "course of medicine" of which he had previously given me an explanation. In a course, composition tea is first given; patient is then put into a steam bath; composition tea is administered in the meantime; patient is kept in the bath ten or fifteen minutes, after which the shower is administered. Dr. Frost said that this was the usual treatment in all diseases.

Recorder. Dropsy, Consumption and all?

Witness. I believe so.

Recorder. What is this lobelia?

Phenix. We'll come to that by and by.

I asked my brother if he had taken any nourishment; he said he had taken some composition tea—it was nothing but composition tea, composition tea—he believed he had taken two pails full. On Saturday evening I found my brother in the back room slightly delirious. I left at half past seven o'clock. At nine o'clock I was called for by Dr. Davids; I found my brother in high fever; he was delirious, complained of constipation of the bowels, and spoke of taking physic.

Dr. Davids urged the propriety of taking a cathartic; Dr. Frost said he never gave cathartics; he was fearful if the bowels were once opened that he could not stop the operation; another reason against cathartics was that he had given injections; lobelia and composition tea were in the injections; he gave four or five injections while I was there in another room; didn't see them given; this was on Saturday night; the injections were given within four or five hours. I staid until four o'clock on Sunday morning; went away and returned same morning between eight and nine o'clock. Dr. Frost said that he had given an emetic on Sunday and another on Monday, said it was lobelia, said on Monday he had given a powerful dose. Tuesday morning my brother was feverish, more delirious than on the previous evening, but rational at times. I told Dr. Frost I had no

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confidence in the Thomsonian system; I wished him to say whether he lacked confidence himself, and I would call a regular physician. Dr. Frost laughed at my timidity. My brother was better on Monday morning; on Monday evening he was in great agony; Dr. Frost said that he had given a powerful dose of lobelia, and ascribed the symptoms to the emetic. I left the patient at about three or four in the morning, and saw him again at about nine or ten o'clock; he was in fever and delirious; I thought he knew me at times; he wished me to keep away from him, and accused me of being the cause of his distress; I ordered all medicines to be discontinued; this was on Sunday evening; thought I would trust to his constitution to throw off the disease; thought the system was depleting; Dr. Frost said it was strenghtening. I went to my office at four o'clock and returned at dusk; found deceased had been bleeding at the nose; ice had been put around him to prevent the bleeding; we had him put into another bed; bed clothes were changed and he was put back; I proposed to send for a regular physician; told Frost the patient was dying, Frost said there was no danger; went for Dr. Cheeseman about nine o'clock in the evening; Dr. Frost wished me to inform Dr. Cheeseman that he was under the influence of lobelia. My brother was a remarkably healthy young man, the very picture of health.

Dr. Frost and Dr. Roleston took turns in giving the medicine; I was in the house when he died, not in the sick room; the last thing given by Dr. Frost was composition tea, given I think on the morning of his death; he died at ten o'clock on Tuesday night.

Among the witnesses was the aforementioned Dr. Wooster Beach, whose testimony, in view of his reputation as a reformer and yet opponent of Thomson and his connection with Eclecticism is very important. It is as follows:

Dr. Wooster Beach, sworn. I am a physician, have practised about twenty years in New York, on what is termed the reformed system; have studied the ordinary practise; have a diploma as a regular physician; have practised on the reformed system exclusively; I know lobelia; and have written a work on medicine, in which I have mentioned the plant; there are three species of lobelia; lobelia inflata, lobelia syphilitica, and lobelia cardinalis; the lobelia inflata grows about two feet high, and bears pale blue flowers; the leaves are small; it does not resemble flax, as has been stated by another witness; don't recollect the flower of the lobelia cardinalia, never used it nor the syphilitica; the lobelia inflata is the only kind I have used; it acts as an emetic and strong stimulant; I usually combine it with other articles; I give from half a drachm to a drachm, with an equal quantity of ipecacuanha; have given one hundred and twenty grains in its pure state, in the course of an hour, with a very favorable effect; it is a good remedy in the incipient stage of fever, and perhaps in the progress of fever, if judiciously used; never used it in cholera; it might be used in cholera with advantage; internally I administer vegetable remedies almost exclusively; I never use minerals; have used lobelia from the commencement of my practice, and never knew it to produce injurious results; have known it to be prostrating when used alone, and for that reason combine it with other articles; have no particular knowledge of Dr. Frost; have some knowledge of the Thomsonian practise, but have never adopted it; cayenne is a pure stimulant, it is used with benefit as a gargle in putrid sore throat; beth root is an innocent astringent, a tablespoonful

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would produce, I apprehend, no serious results; valerian is innocent, so is poplar bark, which is a tonic; sumach is a safe medicine; these medicines all possess more or less medicinal properties; it is difficult to test vegetable substances after they have been introduced into the stomach; there is no proper test, strictly speaking, for lobelia; some tests have been made, but not satisfactory; lobelia is not as destructive as mercury in any form or to any constitution; it is not the fact that no regular physician declines the use of mercury; a very considerable proportion object to its use, and altogether discard it; the most distinguished physicians in Europe and America have abandoned it; treatise upon treatise have been written against its use, and enough to induce any reasonable person to discard it forever; the younger physicians use it more than the older; the system is pretty much a new one, and was introduced about fifty years ago; bayberry is alterative, and astringent; ginger is stimulating, and may be taken safely in sickness or in health; I know of no medicine in the Thomsonian Materia Medica, which is a poison within itself; they are all good, if properly used.

Cross-examined. I know the treatment resorted to by Dr. Frost from the testimony adduced; he differs from me as regards lobelia, I have heard of the different modes, times and quantities that lobelia was administered to the deceased; it does not correspond with my principles, but it is common for physicians to differ; it has not been my practise to use lobelia alone; I have given eighty grains with the same amount of ipecacuanha in an infusion of eupatorium, repeated if necessary every half hour; this combination was to render the lobelia more certain in its operation; I have sometimes found lobelia not so certain in its operation as I could wish; have known it to act as a laxative; would depend upon the quantity given whether it would destroy the action of the stomach or not; if injudiciously given it might prove injurious, but how I cannot say. Have been acquainted with the Thomsonian Treatment for years; have seen lobelia given unmixed; know what a course of medicine is; would consider the treatment in French's case, according to my principles, as injudicious; the first course might have been good, but a repetition I should consider injudicious; should think it was too stimulating, too exciting; it might or it might not have produced death; disease might have taken off the deceased; the treatment might have taken him off; no human being can say with certainty; after the first course I think the treatment would have increased the disease; it is only my opinion; good reasons may be given for an opposite opinion; don't administer lobelia in all diseases; think it would be destructive in some diseases, if given in sufficient quantities; so with the best of medicines we have. Cannot say what would be the effect of a powerful dose of lobelia where there was delirium or great prostration. Doubt whether it would produce death, but have never seen the operation of lobelia under such circumstances.

To Mr. Brown. Checking perspiration, as described to have been done by Dr. Cheeseman, would prove injurious; a vast proportion of diseases are imputed to checked perspiration; it would be more injurious in a diseased than in a healthy condition; it might produce death, might prove fatal in a short time if the patient was very low or prostrate; with regard to the various grades of fevers I agree with the faculty; but I give vegetable instead of mineral remedies.

In slight attacks the Thomsonians use composition tea; in violent diseases they give the courses; I never practised according to their system; my knowledge is derived from books.

To Mr. Phenix. I deem it necessary to understand a disease before I admin-

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ister medicine. It is immaterial how knowledge is acquired, provided it be in possession. Sometimes it is difficult to distinguish between diseases in their incipient stages; during this time we treat them on general principles. In my own practice, I first ascertain the disease before I administer remedies. I formerly bled for pleurisy, but have not of late years. My system is the reformed system. The indications of cure are the same as with the old faculty; I administer innocent remedies in every progress of disease; don't use salts; it enters into one of my combinations, but is rarely used; I make use of the alkalies, carbonate of potash, and bicarbonate of potash, usually termed salacatus; they can scarcely be classed with minerals. Saratoga water may be beneficial in some cases; have not been in the habit of using them; the principles of the reformed system are similar to those of the regular or old school system, except that in the former, all mineral poisons are excluded.

To Mr. Brown. It is difficult to distinguish between fevers at their commencement; when we don't know what type the fever will assume, we treat it on general principles; purgatives and emetics are equally applicable in the commencement. I use a vegetable caustic to remove tumors. My remedies are active but do not destroy the system. The vegetable kingdom contains all the necessary remedial agents; and I only wish mankind would get their eyes open to the difference between the vegetable and mineral practice. (Great applause.)

In the course of the trial, the question of whether Lobelia is a poison arose. The evidence of Pardon Lapham is of interest because of the heroic dose of lobelia that "did not kill."

Cross-examined. Have followed the Thomsonian practice about ten years for a livelihood. Got my information by buying a book. Have a knowledge of diseases as laid down by Dr. Thomson. We give cayenne as a stimulant, and lobelia as a stimulant. We give them both together because the action of the lobelia is like a fire kindled up with shavings, which soon goes out unless there is something to back it up; cayenne is administered for this purpose.

Recorder. How much lobelia would it take to kill a man?

Witness. I said that I had given a half a pound, and that it did not kill.

Then came the charge of the Judge, who closed his lengthy address to the jury in the following words:

You must, gentlemen, do the prisoner justice. Weigh every fact that makes in his favor—weigh also all that makes against him. If you have good and sound doubts that he did not shorten the life of young French, you must acquit him. If on the other hand you believe that he did, you must find him guilty, whatever be the consequences to him or to others.

You owe much to society for the faithful discharge of your high and important functions in this cause—you owe much to the prisoner. You owe it to the whole community, your country and your God, that you deliberate carefully and decide justly on the guilt or innocence of the prisoner. Pursue common sense as your guide,

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gentlemen, and render such a verdict as will justify you to the prisoner, to your own conscience, your country, and your God.

Give way, gentlemen, to nothing but a love of justice—retire to the jury room and interchange your sentiments in an amicable manner, hear one another with calmness, weigh everything carefully, submit everything to a test of common sense, and render such a verdict as in your conscience you believe to be just and right!

Finally, after four hours' deliberation, the jury returned to the Court with a verdict of,—

GUILTY OF MANSLAUGHTER IN THE FOURTH DEGREE, accompanied with a recommendation of the accused to mercy.

Mr. Morrill moved an arrest of judgment on the ground that the accused had never been arraigned, nor the indictment read to him.

Mr. Phenix said that there was a statute for the cure of all such informalities, and that the legality of the proceedings could not be questioned.

Mr. Morrill replied that he had other grounds for his motion of arrest, but what he had stated, he deemed sufficient for the present.

The Court replied that the motion should receive due consideration at the ensuing term, and, meanwhile, the **PRISONER MIGHT GO AT LIBERTY UNTIL A DECISION WAS MADE.**

The Recorder **THEN THANKED THE JURY FOR THEIR VERDICT, AND SAID THAT IT WAS IN ACCORDANCE WITH THE LAW, AND RECEIVED THE UNANIMOUS APPROBATION OF THE COURT!**

Thus ended this most famous trial which, together with that of Thomson, created more interest in early reform American medicine than perhaps all other influences combined. Let us now pass to the *Materia Medica* adopted by Thomson and his followers.

THE THOMSONIAN REMEDIES, TREATMENT OF DISEASE, AND THE FAMOUS THOMSONIAN "COURSE OF MEDICATION"

The Materia Medica of the early followers of Samuel Thomson consisted of botanical products and combinations thereof. The aim was to exclude all poisons, in which list lobelia was not by them included. Their remedies, therefore, excluded such energetics as podophyllum, sanguinaria, rhus, etc., which became important agents with Beach and his followers, the Eclectics. Whilst the Thomsonians rejected mineral salts and the inorganics, these substances were conservatively employed in Eclecticism. These facts have not been generally understood, many physicians and others, who should know better, maintaining that Eclectics used only botanical remedies.

In order that the Thomsonian Materia Medica may be authoritatively recorded in our Bulletin, we reproduce from *The Lobelia Advocate*, 1838, an editorial commenting on this subject, followed by a complete list of the plants used by Thomson and his followers, which also is reproduced by us in full, in the terms employed in the original.

THOMSONIAN MATERIA MEDICA.

Many false and wholly erroneous notions have heretofore existed, and still do, to a considerable extent, with regard to the articles used by Thomsonian practitioners as remedial agents, both as regards their medicinal properties and the number used.

It is believed by many honest, well-meaning individuals, (those, of course, who are wholly ignorant of Thomsonianism,) that the articles used in the Thomsonian Materia Medica, are of the most deleterious and poisonous nature—that Thomsonian practitioners use but one or two articles *in all*, and that the same articles are given in all cases, whatever may be the form of disease; that steam, cayenne, and lobelia, constitute the Materia Medica of the Thomsonian system of medical practice, and that they are very dangerous, and neither of them can be used without great danger to the patient. Now we do not censure folks who thus believe and talk, because we believe they do it ignorantly, yet we do most sincerely pity their ignorance and credulity, for believing the vague and foolish stories of those who are prejudiced and interested, for we lay it down as an indisputable truth, that none but the ignorant, (that is, ignorant of Thomsonism,) interested and prejudiced, ever speak against the Botanic practice, and for the especial benefit of such as are in the habit of talking thus ignorantly and foolishly, we shall make the three following declarations, viz: 1st. Thomsonian physicians use in their ordinary practice of medicine a greater number of distinct

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and separate substances, than the mineralites do. 2d. Thomsonian physicians make and use in their ordinary course of practice a greater number of mixtures from their greater number of simples, than the mineralites do. 3d. There is no article or plant ever recommended by Dr. Samuel Thomson as a remedial agent—there is none contained in his *Materia Medica*, or used by those who bear his name, or practice upon his system, which contains a particle of narcotine or poison, and which does not harmonize with the laws of life, and aid nature in her efforts to overcome the disease and restore the patient—the exaggerations, misrepresentations, false reports, and downright lies of the enemies of the system to the contrary notwithstanding. And in order that the public may be enabled to judge for themselves as to the facts in this matter, and see who is right, we subjoin a list of all the principal articles (that is, plants,) used by the Botanic practitioners, and we earnestly solicit the public, one and all, to examine for themselves, and as soon as any person, ("scientific" M. D.'s not excepted) shall have discovered any poison or narcotic in the list, we shall thank them to inform us of their discovery, for we say decidedly, and without fear of contradiction, that there is no article used by Dr. Thomson or his followers, which might not be eaten by spoon fulls like food, and produce no other effects than nausea, vomiting, or purging.

The following is a list of plants:

(Common)	(Technical)
1. Lobelia	<i>Lobelia Inflata</i>
2. Cayenne	<i>Capsicum Annum</i>
3. Bayberry	<i>Myrica Cerifera</i>
4. Pond Lily	<i>Nymphia Odorata</i>
5. Hemlock	<i>Abies</i>
6. Sumach	<i>Rhus Glabrum</i>
7. Witch Hazel	<i>Hamamelis Virginica</i>
8. Sweet Briar	<i>Rubus Strigosus</i>
9. Poplar	<i>Populas</i>
10. Squaw Weed	<i>Erigeron Purpureum</i>
11. Balmony	<i>Chelone Glabra</i>
12. Barberry	<i>Berberis Vulgaris</i>
13. Peach Kernels	<i>Amygdalus Persica</i>
14. Bitter Root	<i>Apocynum Androsemlfolium</i>
15. Ohio Kercuma	<i>Frasera Verticillata</i>
16. Yellow Root	<i>Hydrastis Canadensis</i>
17. Cherry Kernels	<i>Prunes Virginiana</i>
18. Valerian	<i>Cypripedium Pubescens</i>
19. Myrrh	<i>Myrrha</i>
20. Ginger	<i>Zingiber Amonum</i>
21. Black Pepper	<i>Piper Nigrum</i>
22. Camphor	<i>Camphora</i>
23. Turpentine	<i>Terebinthinae</i>
24. Peppermint	<i>Mentha Peperita</i>
25. Spear Mint	<i>Mentha Veridis</i>
26. Summer Savory	<i>Saturciae Hortensis</i>
27. Pennyroyal	<i>Hedeoma Pulegiordes</i>
28. Hoarhound	<i>Marrubium Vulgare</i>
29. Elecampane	<i>Inula Helenium</i>

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(Common)	(Technical)
30. Mayweed	<i>Anthemis Cotula</i>
31. Wormwood	<i>Artimisia Absinthium</i>
32. Tansy	<i>Tanacetum Vulgare</i>
33. Chamomile	<i>Anthemis Nobilis</i>
34. Mullen	<i>Verbascum Thapsus</i>
35. Burdock	<i>Articum Lappa</i>
36. Featherfew	<i>Matricaria Vulgaris</i>
37. Black Birch	<i>Betula Lenta</i>
38. Bitter Sweet	<i>Celastrus Scandens</i>
39. Skunk Cabbage	<i>Ictodes Foetida</i>
40. Wake Robbin	<i>Arum Triphyllum</i>
41. Boneset	<i>Eupatorium Perfoliatum</i>
42. Evan Root	<i>Geum Virginianum</i>
43. Clivers	<i>Galium Verum at Aparine</i>
44. Balsam Fir	<i>Penies Balsamea</i>
45. Slippery Elm	<i>Ulmas Fulva</i>
46. Va. Snake Root	<i>Aristolochia Serpentaria</i>
47. Mustard	<i>Sinapis</i>
48. Horse Radish	<i>Cochleria Armoracia</i>
49. Butternut	<i>Juglans Cinerea</i>
50. Blue Vervain	<i>Verbena Hastata</i>
51. White Vervain	<i>Verbena Urticifolia</i>
52. Sweet Golden Rod	<i>Solidago Odora</i>
53. Pipsisseway	<i>Pyrola Umbellata</i>
54. Bitter Thistle	<i>Cnicus Offincinalis</i>
55. Yellow Dock	<i>Rumex Crispus</i>
56. Lovely Thistle	<i>Carduus Benedictus</i>
57. Prickley Ash	<i>Xanthoxylon</i>
58. Wild Lettuce	<i>Pyrola Rotundifolia</i>
59. Unicorn Root	<i>Aletris Farinosa</i>
60. Gold Thread	<i>Coptis Trifolia</i>
61. Archangel	<i>Lycopus Virginicus</i>
62. Balm of Gilead	<i>Populus Candicans</i>
63. Ginseng	<i>Panax Quinquifolia</i>
64. Meadow Fern	<i>Myrica Gale</i>
65. Red Clover	<i>Trifolium Pratense</i>

There are a few other unimportant plants used and recommended by Dr. Thomson, yet the above are the principal.

In connection with the foregoing list of remedies comes in proper sequence the opinions and theories Thomson held concerning disease and its cure. This includes descriptions of his "steaming" processes and his famous patented "Courses of medicine."

THE THOMSONIAN REMEDIES, TREATMENT OF DISEASE, AND "COURSE OF MEDICATION"

In Thomson's day, directions for treating disease were supplied by himself or his authorized agents when a patent right to practice by the Thomsonian method was purchased. Directions for making his preparations, as well as for gathering plants and purchasing drugs, were given as a part of the franchise.

Throughout America, agents who by authority of Thomson held the privilege of selling the patent right to practice, also carried stocks of drugs to sell to purchasers of the patent. These stocks were something very large, enough to surprise even dealers in drugs of the present day. They were also advertised to readers of Thomsonian literature, as is shown by the following reproductions of an advertisement in the "Lobelia Advocate," 1838:

DR. JOHN ROSE

Still offers to his friends, the Botanic remedies—such as are used by Botanic Physicians: Numbers 1, 2, 3, 4, 5 and 6, with Bayberry, Cloves Composition, &c. &c. &c. All genuine, and as responsible as any other establishment.

Westminster, June 30.

In like manner the "Botanic Medical Recorder," 1844, presents an advertisement which is of peculiar value in that it gives the prices then prevailing for well-known drugs of to-day, many of which were thus introduced to the trade.

MEDICINES.

We have a good stock of first-rate Medicines, which we will sell for cash cheaper than they have ever been bought in this city, except of ourselves. Among them are,

Lobelia Seed, per lb.,	\$1.00,	Ptelea, an excellent article,	.37½,
Lobelia Leaf,	.50,	Balmony,	.62½,
Cayenne, first quality,	1.00,	Boneset, flowers,	.37½,
Cayenne, 2nd quality, good,	.62½,	Cohosh, blue and black,	.62½,
Bayberry, very best,	.37½,	Wild Ginger, ground, excellent,	.75,
Ginger, first rate,	.37½,	Beth root,	.62½,
Hemlock,	.31¼,	Pleurisy root,	.50,
Raspberry, Witch Hazle,	.31¼,	Elm,	.31¼,
Composition,	.62½,	Golden Seal,	.40,
Bitters, spiced or plain,	.62½,	Nervine,	.62½,
Poplar,	.25,		

And most other articles used in our Practice. When large orders are sent, a small discount will be made on some of the above articles.

BOTANICO-MEDICAL COLLEGE,
South side third street, one door east of Broadway,
Cincinnati, O."

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The Thomsonian Treatment and "Courses of Medicine" may perhaps be no more authoritatively shown than by a verbatim reproduction of that section in "The Thomsonian Materia Medica," by Samuel Thomson, thirteenth edition:

RULES TO BE OBSERVED BY THE PRACTITIONER, IN THE TREATMENT OF DISEASE.

1. At the commencement of an attack of the disease, the first thing to be brought to mind should be, what has caused the attack, and how should it be treated, and how removed.

The "ways and means" cause much trouble and speculation with the patient, who should ever be alive to the best means for his future welfare.

2. One of the fundamental principles in the Thomsonian practice is, that all diseases originate from the same cause, directly or indirectly—that is, from the deranged state of the fluids of the body, by the absence of heat, or loss of vitality; which produces an over pressure or excess of circulation to the head, and a proportionate deficiency in the feet.

This creates derangement in the organs of sense, and a proportionate want of action with the digestive apparatus, by which the bowels become constipated, and the evacuations of the body are much obstructed, for want of the requisite action and equilibrium in the fluids, and the consequent order attendant upon such a state of things.

3. This derangement having been produced by the loss of vitality, or taking cold, and the consequent absence of heat at the lower extremities, and an excess at the head in the same degree, to bring about an equilibrium properly through the system, or to establish order where there is naught but disorder, is what we wish. To restore warmth to the feet and reduce the pressure upon the brain, by correcting digestion, promoting perspiration, and removing obstructions from the stomach, bowels, and their dependencies, is the proper mode to effect this object.

4. The best method yet discovered is a thorough Thomsonian course of medicine, when properly administered, which creates a healthy circulating medium in the lower extremities, equal with that of the head, and thus produces order and regularity both in body and mind.

5. The first knowledge with a practitioner should be to understand the principles or cause of the derangement, disease, or loss of heat; and secondly the proper course of treatment to bring the deranged parts to order by restoring the vitality, or heat, by the loss of which the whole man has become diseased.

6. There is no immediate danger in any case where the veins on the patient's hands and feet are full. This is the surest test by which a practitioner may determine whether or not his patient is doing well. Or a long and regular respiration will indicate the same state of the body, as well as a regular pulse.

DIRECTIONS FOR EQUALIZING THE CIRCULATION

Through the system, which must be done in all cases of disease, to restore the patient to health.

In the first place, put the feet of the patient into water as hot as can be borne, increase the heat by adding water of a higher temperature until a copious perspiration is started on the forehead and in the palms of the hands; the patient may be

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in the bath if thought necessary; this will afford some relief. Then take brown emetic, cayenne, composition, and nerve powder, of each one teaspoonful, put them into one pint of boiling water and let them steep for ten minutes; sweeten with molasses, and let half the quantity be given as an injection, as hot as it can be borne, and let the patient retain it as long as possible. This will turn the excitement from the head downwards and sickness at the stomach will be produced. Then give a table spoonful of the tincture of lobelia and a small quantity of cayenne, in some simple tea, and if this does not produce sufficient vomiting repeat the dose.

The vomiting will be easy, the veins in the hands and feet will be filled, the head, in consequence of the equalization of the circulation, will be relieved, and the whole system will become quiet and easy.

Let these directions be strictly followed, and by so doing I hesitate not to say that three fourths of the attacks of the disease—such as colic, dysentery, quinsy, croup, pleurisy, head-ache, liver complaint, &c.—might immediately find relief. Let every practitioner lay up these remarks as valuable truths, to be observed in all cases where there is disease or derangement in the system, in attempting to afford relief or perform a cure.

Order must be brought about in the body by an equalization of the fluids, and it matters but little how that is effected—whether by a course of medicine, steaming, bathing the feet in hot water, an emetic, or stimulating with hot liquor, hot medicines, or any other course which will effect this relief on the system. To accomplish this successfully in the greatest number of cases is what constitutes the eminent physician.

STEAM OR VAPOR BATH.

Steaming is an important part of the Thomsonian practice. Many cases which prove too stubborn for the medicine unassisted by the vapor bath, are through its agency relieved. In all diseases where the vital heat has become so far exhausted as not to be rekindled by the administration of medicine, steaming is indispensably necessary. In all cases of suspended animation, a gentle bath and bathing the feet in hot water, should be immediately resorted to. In cases of falls and bruises, or accidents of the like, this treatment rarely if ever fails of affording relief. It is also useful in preventing sickness as well as in curing it.

When a person has taken a severe cold, and disease is rapidly getting hold of the system, a thorough steaming, as hereinafter directed, will frequently throw off the disorder. Always remember while giving the vapor bath, to keep up the internal heat, to prevent faintness; for which purpose give a tea of cayenne, or of any other warming or stimulating article, with occasionally wetting the patient's face and breast in tepid water.

The most convenient and effectual way to administer the bath is to have a box constructed for that purpose. The following plan is perhaps as good as any. Let the box be in the form of a closet, two feet four inches deep, two feet six inches wide, and six feet high. It should be elevated from the floor about six inches, by the means of blocks or legs. Let the bottom be made tight and in form of a sink, with a vessel underneath to receive the condensed water. The door may be five feet and a half high, and one foot ten inches wide, with a hole for ventilation (before which let a curtain be drawn) six by nine inches, about four feet from the bottom. Let the top be boarded tight, and at the bottom, immediately above the sink, let a portable floor, or a board eighteen or twenty inches wide, be supported by

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means of cleets fastened to the sides of the box, under which let the steam pass in by means of a lead pipe.

This portable floor will break the volume of the steam, cause it to ascend on all sides of the patient, and prevent its burning his feet. But where a box cannot be had, the following method may be adopted.

Have three or four stones or bricks heated, and let the patient sit in a chair, undressed, with a blanket around him, to confine the vapor and shield him from the air; then place a two gallon kettle with a concave bottom, with about one quart of water, between the feet inside of the blanket, put in one of the heated stones, and as soon as that begins to cool put in another, which continue to do till the patient is sufficiently warm, which will be in from ten to fifteen minutes.

The patient may stand during the operation in this way, instead of sitting, if able. But when too weak either to stand or sit over the steam, it may be administered in bed, by heating several bricks, wrapping them in wet cloths and placing them around him. Or a better plan is, to have a frame made, to place over the patient's body to elevate the covering, and then pass the steam into the bed by means of a pipe.

The method of producing the steam, in order to administer the bath in the first and last mentioned ways, may be as follows: Have a tin or copper boiler constructed in form of a cylinder, in such a manner as for the heat to pass up through the centre, and to be perfectly air tight except one tube by which to put in water (to which a tight stopper may be adapted,) and another for the steam to pass out at, on which a pipe must be closely fitted, and from thence passed to the place where you desire to have it. The boiler may be filled with water, and placed on a stove or furnace. As soon as the water commences boiling, the steam will pass out of the tube and through the pipe to any place desired. The temperature of the steam will be regulated by that of the fire over which the boiler is placed, and must be adapted to the patient's strength and ability to bear it.

TREATMENT OF DISEASE.

In all cases where the patient has little or no appetite, and is declining in health and strength for the want of support, simple treatment, such as tonics, stomachics and soothing medicines, ought to be used; but if they fail to answer the purpose, it is evident that the system is laboring under serious difficulties, and that the patient will not find relief until the obstructions are removed, perspiration made free, and digestion regulated. In such cases the articles that afforded nourishment in health produce excitement and irritation in the stomach, distress in the head, and a general derangement throughout the internal viscera, the arterial and nervous system, and a feverish excitement on the surface. To remove this, we point out the following plain and simple mode by which all curable forms of disease may be treated successfully, and the patient restored to health. There is no danger attending the operation of the medicines, as in the regular practice; therefore if one course of medicine is given more than was actually necessary, no injury will result to the patient, and the time and medicine is all that is lost. How important, then, that thorough treatment should be observed, when so momentous an object as the life and health of the patient is concerned.

TO BE REMEMBERED.

In all cases where there is inflammation or a concentration of febrile excitement to any particular point, for instance a sprained joint, distress in the head,

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inflammation of the stomach and bowels, &c., the course of medicine will remove the obstruction by equalizing the fluids throughout the system, by which means the patient will find immediate relief, thus confirming the principle of the *UNIT of disease*. If such concentration of excitement be caused by morbid matter being received into the system by means of a foetid atmosphere, bad food or putrid water, one course may not be sufficient to exclude all the morbid poison from the secretory vessels, the evidence of which will be the want of an appetite, sickness at the stomach, weakness in the limbs, and a febrile excitement. If so, courses should be repeated at suitable intervals of time, until these symptoms pass away, and by the circulation through the body being equalized a healthy action is restored; the appetite becomes good, the digestive organs perform their natural functions, and the sleep is quiet. Courses of medicine may be successfully employed to remove distress and ease pain, and to make the patient comfortable in all cases of *whitlows*, *felons*, *biles*, *bruises*, or any other excessive inflammatory concentration of the fluids of the body where relief cannot be found from any other course of treatment.

First, soak the affected part in lye made of hard wood ashes, then apply a poultice made of flax seed, or yellow lily, or made of bread and milk, which should be kept moist while under the operation of the course. This will relieve the distress and bring the sore to a crisis, and is perhaps the surest way to relieve the patient. It is expected that all simple means will be tried before the course is resorted to. It should be remembered that all diseases are brought on by derangement of the fluids of the body, and that all diseases can be cured by restoring order and regularity to said fluids. Courses of medicine will effect this, if properly administered and attended to in season. Where there is distress there is disorder and a derangement of the fluids, and consequently a restoration of order and an equalization in the system, will afford relief.

In reading this work, do not forget this important principle; that all diseases herein mentioned are brought about by a decrease or derangement of the vital fluids by taking cold or the loss of animal warmth. And that the name of the complaint depends upon what part of the body has become so weak as to be affected. If the lungs, it is consumption, or the pleura, pleurisy; if the limbs, it is rheumatism, or the bowels, cholic, or cholera morbus.

But after all, these different diseases are caused by the partial loss of vitality or warmth, and all may be removed by a restoration of the vital energy, and removing the obstructions which the disease has generated.

It is thought by some that unless the physician know the name which has been given to the disease by others, he cannot treat it successfully. If he cannot readily call to mind the variety of names so profusely lavished by the regular physicians upon the different forms of disease it will not prevent his medicine from having a beneficial effect, nor prove that the physician has not *valuable practical knowledge*, which is after all the true philosopher's stone of which the patient is in pursuit.

Is it right to infer that because a man cannot command all the names that have been written by other people, as liable to err and as frail as himself, that he cannot by practice, know the use of medicine or the nature of disease: or because he cannot give the respective bones, muscles, ligaments and vessels of the body their appropriate names, he cannot cure the colic or dysentery?

When our pilgrim fathers landed at Plymouth the aborigines brought them long golden ears, of a vegetable substance, which they had never seen or heard of before, neither had the great or learned men of their father land, and we are told that they were kept from starvation, were nourished and rendered comfortable

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through a long dreary winter by the support this vegetable substance afforded, furnished by illiterate savages. Now shall we deny that these people were nourished and supported by this valuable plant, because they did not know that it was Indian corn, and because it was furnished by those illiterate savages, who knew not the meaning of a diploma and had no knowledge of the Greek or Latin languages? Impossible!! The virtues and nutriment were in the corn, and the true science in the matter was in having the knowledge of it. In this respect the savages were scientific and the pilgrims were the quacks, notwithstanding their boasted knowledge in other respects. Give us more practical knowledge and less theorizing; more of true science and less speculation. To remove the infirmities of our fellow men, give us more innocent vegetable substances and less poisons. Then shall we be led to rejoice over the bounties of Providence, in filling the soil with innocent remedies that the poor suffering sons of humanity may there find an antidote for every bodily ill.

COURSES OF MEDICINE. No. 1.

First—To prepare for the course, let the patient take a dose of composition, or No. 6, in herb tea, hot, then go into the bath and put his feet into hot water; raise the heat of the bath to about 100 or 110 deg. Fahrenheit. After a lively perspiration starts, and the veins have become full upon the feet, hands and temples, and the pulse much quickened, say to 95 or 100 per minute, take a quart cup of cold water and add hot water to it until its temperature is about that of the surrounding atmosphere; then open the door of the bath, and have the feet taken out of the pail, and pour your water over the head and shoulders, completely drenching the whole surface of the body and limbs. Then let the patient step out of the bath and be rubbed with a coarse napkin or towel. The indications of a healthy action now are, full veins on the extremities and a lively appearance in the flesh throughout the system. Now let the patient go into a warm bed, with a hot stone, brick or jug of hot water at his feet.

Secondly—Take two ounces of No. 3, or canker tea, and put it in a quart bowl, and pour upon it one pint of boiling water; let it steep about ten minutes, strain off three gills, and when hot add two teaspoonsful of brown emetic, one teaspoonful of cayenne, one teaspoonful of nerve powder, and if it is a putrid case, one table-spoonful of No. 6; sweeten it with molasses or sugar. Pour off a wineglass full of this compound, and give it to the patient as soon as he is in bed, and then let half a pint of the same compound be given as an injection. Let two or three wineglasses more be given with about half a teaspoonful of emetic in each, at intervals of fifteen minutes, if that given first does not operate sufficiently. While under the operation of the course, let the patient drink freely of a tea made of spearmint, peppermint, pennyroyal, or summersavory, and also of milk porridge or crust coffee, which will nourish and invigorate the body.

Thirdly—In from three to six hours the patient will generally be through with vomiting and the stomach settled: then let him take a second bathing precisely similar to the first; let him stay in ten or fifteen minutes, remembering to shower with the tempered water on coming out. Let the surface of the body be rubbed thoroughly and then apply to it some cold whiskey and water, to completely close the pores, and the patient may then dress and wash his hands and face in cold water, and if the stomach and bowels have been thoroughly cleansed, he will feel completely well.

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Fourthly—Let the patient take of the bitters No. 4, or syrup No. 5, to restore the digestive organs, and his health is soon restored.

This course may be repeated if thought advisable, but it is the most powerful one that is usually administered.

COURSE No. 2.

In case of inflammatory sore throat, quinsy, rattles or croup, take a dose of composition, cayenne, or No. 6, then take a bath as in course No. 1. Bathing the feet alone will answer, if the bath cannot be handily applied: then give one fourth of a glass of tincture of lobelia, after which give an injection as prepared in course No. 1, or the brown emetic may be put into a boiling hot tea of composition, witch hazle, or red raspberry leaves. This will change the field of excitement from the upper to the lower extremities, and will also turn the pressure of blood in like manner from the head, lungs and neck to the bowels and feet.

In all cases of difficulties or inflammation about the region of the lungs or head, the injection should be made sweet with molasses to loosen the bowels, and very stimulating with No. 2, and sufficiently powerful with brown emetic to cause the patient to vomit, and should contain also a teaspoonful of nerve powder, or instead of two teaspoonsful of the tincture of asafetida, to quiet the nervous system while under the operation. Repeat the tincture by the stomach, if the injection does not cause sufficient vomiting, and immediate relief will be the result, unless the patient is very low, or beyond the reach of medicine.

After the medicine is done operating, the steam may be applied as in course No. 1; the body bathed with whiskey and water, and the feet and legs with stimulating liniment. Put a stimulating plaster about the neck, with the sides notched, so that it may extend to the edge of the chin, and over this put one or two thicknesses of flannel to keep the neck warm. The same plasters may also be applied to the feet to good advantage. This treatment turns the circulation so completely to the lower extremities that relief is almost instantaneous. In the recent state of the disease this treatment soon brings the difficulty to a crisis, and the patient recovers with very little trouble. In cases of croup or rattles, cloths wet with hot whiskey and water wrung out and applied to the bowels as hot as can be borne, and often changed, are a great assistant to the other treatment in restoring the lost heat or vitality by absorption.

With such practice we have relieved many cases of violent disease of the chest and head, and these directions should be remembered and followed by all in similar cases.

COURSE No. 3.

There are various forms in which the emetic may be given. A light course may be given a child; by first bathing the feet in hot water and giving freely of penny royal, spearmint, pepper mint, or summer savory tea, with the addition of a little cayenne and lobelia tincture. Then to a cup of the hot tea and half a tea-spoonful of cayenne, the same quantity of brown emetic, and a tea-spoonful of the tincture of asafetida, and give it as an injection. It will produce copious vomiting, take the distress from the head, and produce immediate relief.

After the operation the body of the child may be bathed thoroughly with whiskey and water about blood warm. Put on clean, warm, dry clothes, and place the little patient in bed, and it will feel much relieved and refreshed.

If the stomach is so weak or irritable as to reject the cayenne or emetic, given

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as above directed, let the patient drink herb tea until the system becomes moist with perspiration, then give the emetic in form of pills, or in honey, any kind of sweet meats, preserves or syrup, or in weak pearlash, or saleratus water; in any of the mint teas or simple drink; or it may be given in toddy, sling, beer or cider. It may also be taken in lemonade or orange juice and in a great variety of other ways.

If the patient is determined not to take the emetic, he may be deceived by preparing it in one of the above forms, and not know that he has taken it until it begins to operate.

Then by giving the herb teas or composition, a thorough course may be had without much trouble. But if the child detects the taste of the emetic when mixed with these articles, let him taste of some of the drinks made pleasant, just sufficient to produce a desire for more, then put in your emetic, unnoticed by the patient, and let them hurry to drink it before the taste is detected, or they have a chance to know what it is.

COURSE No. 4.

Let the patient take of composition or herb tea till an easy perspiration is started, then administer half a dozen emetic pills; they will gradually dissolve, and the secretions will take up their emetic properties and nausea will be continued for some time before vomiting takes place. If the operation is not sufficient, an injection as directed in Course No. 1, may be administered, or instead of brown emetic, the tincture may be substituted, and if thought advisable a half dozen more pills may be taken. This will generally answer the purpose. After the medicine has done operating, take a vapor bath as directed in Course No. 1, remembering if the circulation is not good in the extremities, to bathe the feet in hot water, and then apply to the feet and legs the stimulating liniment.

The proper application of these courses of medicine, in the various forms of disease to which man is subject, we consider the key-stone in the grand arch and superstructure of the Thomsonian system of practice; for without the lobelia, cayenne and the vapor bath, the grand bulwark of the system would be wanting. These valuable articles stand in the front and foremost rank to oppose all attacks, stages and forms of disease to which frail humanity is subject.

Having given the history of Samuel Thomson, close linked with the record of Lobelia, and his method of treating diseases, it remains to close the chapter with the ending of the life of the most picturesque of all men connected with the evolution of American medicine and the American *Materia Medica*. Comes now as the final word the death of Samuel Thomson.

DEATH OF SAMUEL THOMSON

"See, when the patient's taken sick,
Coldness has gained the day;
And fever comes as nature's friend,
To drive the cold away."

Some men advocate one thing and practice another. It is said of a renowned prohibition orator, who had been criticised for using alcoholic liquids: "Do as I say, not as I do." Such as this can not be charged against Samuel Thomson. Fanatically zealous in his cause, an advocate of the Thomsonian Course of Medication in all that the course implied, he passed from life heroically partaking of lobelia, enemas, and the recognized Thomsonian syrups, teas, etc. Indeed, September 22, 1843, he ordered a full "course of medicine," although he knew full well that his earthly end was near. Heroically he fought death until, at last, on the morning of October 4, 1843, came the ending of it all.

This Bulletin would be incomplete without a description of the last days of this interesting personage. We accordingly reproduce from the *Botanico-Medical Recorder*, November, 1843, the report of Mr. Nathaniel S. Magoon, of Boston, who cared for Thomson in his last illness.

[From the Thomsonian Manual.]

Mr. Editor: Having been requested by the friends and relatives of Dr. Samuel Thomson to give an account of his last sickness and the medical treatment he received during that sickness, and thinking the public who are favorable to his system, may also feel interested in the subject, I have written the following report which I sent you for publication in the Manual:

SICKNESS AND DEATH OF SAMUEL THOMSON.

For the last three or four years Doctor Thomson had been in the enjoyment of tolerable health for a man of his age; and although subject to attacks of diarrhoea, still, by a careful attention to himself, he soon checked its progress and restored his health; and by his own medicines, and always by his own directions. His health for the last year had not materially varied from what it had been for the period above stated, until the first of August last, when the relax set in and continued until the 26th of September; as he had been so accustomed to being up in the night, and of having his own way of treating himself when this complaint was on him, nothing serious was thought of it, until he expressed his fears that he could not hold out much longer, without a more thorough resort to medicine. Medicines of an astringent nature were then prepared by his directions, which relieved him in two

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days—during which time he had administered to him six enemas. On Friday, September 22, he observed that he must have a course of medicine. — My wife observed that it was near night, he had better take some canker tea, then, and take the emetic in the morning, to which he assented; the tea when taken vomited him.

Saturday morning, Sept. 23, he got up and dressed himself as usual, went into the yard; he was told that he ought not to go out; he replied that the air was clear and bracing, and would not hurt him. He soon returned to his room, and ordered an emetic of tincture of lobelia, in vegetable jelly; which was got, and in the absence of the nurse he took part of it, sitting by the fire, which made him sick—when the nurse returned she told him that he had done that which he had cautioned others against doing, by taking the emetic when exposed to the air, and advised him to go to bed; he replied he would if someone would help him undress—he was never known to ask to be helped in undressing before. He had a stimulating enema—and was assisted to bed, and had steaming stones put to his back and feet, and he then ordered more emetic mixed, but when offered him he delayed $\frac{3}{4}$ of an hour before taking it. His emetic was prepared of tincture of lobelia in vegetable jelly, and a tumbler of canker tea; he drank pretty freely of pennyroyal tea, porridge, &c., and threw up a larger quantity of cold phlegm, than was usual for him to when taking a course. His course operated well, and he was washed with spirit and rubbed with flannel, and put into a clean bed. He appeared cheerful and joked freely; through the night he drank often of composition tea and porridge.

Sunday morning, Sept. 24, he got up and eat a light breakfast, sat by the fire, and as he appeared dull, he was asked how he felt, after his course? He replied he felt as much refreshed as a boy who had been whipped; he then laid down, and on being asked if he thought the emetic did not operate well the day before; he said, no, the lobelia did not do justice, that it seemed to raise a load from the stomach part way, which fell back heavy like a lump of lead. He was asked if he would have another emetic on Monday. He said that he did not wish for anything stronger than the cough syrup, with a little lobelia to raise the phlegm gradually. He then ordered enemas of slippery elm, nerve powder, a small quantity of cayenne and milk, all scalded together. He was asked why he ordered them in that way, and replied that they were to strengthen him, for his throat was so sore that he could not swallow; this to be continued until he was restored; seeming to express some doubt that he should ever recover. Soon fell asleep, and then slept an hour, when he awoke, took some chicken broth and appeared more comfortable. He said that his bowels felt much relieved, and that his disease was principally in the gland of his throat. He then took a short ride, the weather being clear, and returned in good spirits and sat up until after tea; he was watched with, and during the night he drank freely of composition tea, and porridge, but rested quietly, and in the morning we thought him recovering. He got up and took some breakfast, and wished to go out, but on being advised not to, he concluded it was not best, and took an enema prepared as before, he soon went to bed, had steaming stones to his feet, and as he complained of severe pain at the stomach, No. 6, with hot water, and sweetened, were given, which soon relieved him. He was again urged to take an emetic, but refused, and when asked what would relieve him if he did not take an emetic, he replied, time and simple medicines, if anything. In the afternoon, he wished to get up and be shaved, which was done—and on attempting to go to bed again, he could not without help; he was asked why he could not walk better? and replied that his rupture—which he had been troubled

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with for a number of years, and considerably so for three years past—had fell again. The man who shaved him, said the doctor had considerable of a high fever, when the nurse repeated the following lines in his poems—

“See, when the patient’s taken sick,
Coldness has gained the day;
And fever comes as nature’s friend,
To drive the cold away.”

When this verse was repeated, he smiled and said that is right.

He then asked for No. 5 syrup, which was given, and had flannel wet in brandy applied hot to his body—and his head, feet, legs and hands, were rubbed with essence of pennyroyal—the flannels would be quite dry in an hour, and required to be renewed often. At 6 o’clock, P. M., got him up, and administered an enema, soaked his feet in hot water, bathed him with spirit, and put in bed again, and through the night he rested comfortably.

Tuesday 26, he took porridge for breakfast, and followed a similar treatment as on Monday, sat up only to have his bed made; next day he took a spoonful of lobelia herb steeped and strained, which vomited him and raised a large quantity of phlegm, and he appeared relieved—he was rubbed again with warm spirit and rested well at night.

Thursday 28, treated him much the same as the two preceding days, until about twelve o’clock, when his right leg from the knee down to the foot became cold, and it was with great exertions by rubbing and applying steaming stones that the natural warmth was restored, the left leg grew cold in about an hour, and the same means restored it that had been applied to the other. He said but little during the day, being much inclined to sleep; occasionally wandering in mind on waking. Fears were expressed to him, that unless he took more hot medicines he would die, to which he replied that he did not wish to live; through the night, he occasionally revived and then failed again, and appeared gradually losing strength, and during the next day remained about the same.

During this time, all of the prescriptions were of his own ordering, and all made known to him; when he got up, put his feet into warm water and he had a steaming stone before him and a blanket thrown over his head, as he said it relieved the distress in his throat. His medicines were now simple and soothing preparations to ease his throat and help expectoration, and nourishing food and enemas to sustain nature; but age and infirmities were unable to bear up under such complicated and severe sickness, and he gradually failed until the morning of the 4th of October, when he dropped away like going to sleep. He died highly respected and deeply lamented.

N. B. Last year about Thanksgiving time, the Doctor expressed a belief that he should die before spring; stated that his father was found dead in his bed and that he thought that he should die very sudden, and was often unwilling to be left alone on that account. Several times during the summer, said that he should die in the fall, expressed his firm belief that he should not see seventy-five years, which would have been his age in February, 1844. In November and December last, he frequently mentioned that he believed that he should die before spring, and arranged some of his business with me, at his own suggestion. Last summer he had an appointment to visit Baltimore, or gave his friends encouragement that he should go in September or October, but a few weeks before his death.

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On being asked if he was going, he said, No; he had rather die at home. About three weeks before his death he had some disappointment in settling some business, he was apprehensive that he had lost a considerable sum of money, which was a source of great perplexity and worryment to him, and no doubt tended to fatigue and weaken him.

Respectfully yours,

Boston, October 26, 1843.

NATH'L S. MAGOON.

THE END.

Drugs and Medicines of North America

This publication was instituted as a Quarterly, in 1884, by J. U. and C. G. Lloyd. It considered the medicinal plants of North America, until June, 1887, when, for want of time, the editors were forced to discontinue it. Among the drugs presented therein, *Hydrastis Canadensis* (1884), was reproduced as the Bulletin of The Lloyd Library, No. 10, whilst *Lobelia* becomes a feature of the present Bulletin, (No. 11). This portion is paged (64 to 106), according to the folios of the original publication.



Samuel Thomson.

His System and practice Originating with Himself.

Born Feb 9th 1769

[From "The New Guide to Health," 1835.]

This portrait was taken when Thomson was younger than that shown in our frontispiece. It is characteristic in the prominence given the wart on the side of the nose.
—J. U. L.

CONCERNING LOBELIA

Lobelia. Our work would be but partly accomplished did we not present something concerning the drug lobelia, with which the name of Thomson is so intimately connected. We therefore, from *Drugs and Medicines of North America*, by J. U. and C. G. Lloyd, September and December, 1886, present verbatim selections from the article on lobelia. This article carries, in foot notes, many references and much valuable information concerning Thomson, the Thomsonian remedies, and the history of lobelia outside of its use by Thomson and his disciples. Whilst no effort is made in any wise to revise the statements contained therein, or to review the subject from 1886 to the present time, the editor feels that he may, with propriety, make a few general remarks concerning the subject.

Lobelia, as shown by the article to follow, was employed in medicine before the date of Samuel Thomson, but not in amount sufficient to detract from the reputation of Thomson as the man who discovered and introduced the drug. (See page 88, *Drugs and Medicines of North America*, December, 1886, same page, this Bulletin.)

The alkaloid lobeline, described by us (pages 73-78) and physiologically investigated by Professor Roberts Bartholow, M. D. (pages 89-92), proved to us a subsequent disappointment in that the solution of whatsoever salt might be employed, or the alkaloid itself in substance, failed to give to physicians the value of representative galenical preparations of the whole drug. Consequently, within a moderate period from the time of its study and introduction in *Drugs and Medicines*, by reason of these facts, the use of either the alkaloid or of any of its salts was discontinued.

INFLATIN, pages 76-78, *Drugs and Medicines*, needs, in our opinion, to be further investigated. Its position has not, to our knowledge, been determined, and whether it be a fatty acid, a stearoptene, or a concrete wax, is yet problematical.

The medical history of lobelia has, in our opinion, been but superficially touched, even to the present day. The recent investigations of Dr. E. Jentzsch, of Chicago, and of others of the Eclectic school in medicine, in a hypodermic direction, leaves the subject of lobelia, in a therapeutic sense, no less graphically before the profession at this date than, nearly a century ago, it was in the days of Samuel Thomson. Lobelia is one of the most promising and most fruitful of the American drugs, and, in the hands of physicians who know how to use it in disease, it is one of the most useful.

JOHN URI LLOYD.

PLATE XXXIV.



LOBELIA INFLATA.
(NATURAL SIZE.)

LOBELIA.*

INDIAN TOBACCO.

PARTS USED.—The dried flowering plant and the seeds of *Lobelia inflata*, *Linnaeus*.

Natural Order Campanulaceæ, Tribe Lobeliæ.



FIG. 126.
A small flowering plant of *Lobelia inflata*, (natural size.)

BOTANICAL DESCRIPTION.—*Lobelia* is an annual herb growing in dry fields and pasture grounds and woodland pastures. In dry sunny places it attains a height of a few inches to a foot or two, the usual height in pasture lands being about a foot. In shady, rich soil, however, it is more luxuriant, growing two or three feet and becoming more slender and fewer branched. The plant flowers in August continuing until frost into September. When the time to flower arrives, each plant begins to bloom, no matter what its height or size. Often plants will be found in bloom only an inch or two high, and only bearing three or four small leaves and as many terminal flowers. Our figure 126 represents such a plant.

The roots of *Lobelia* are few and fibrous. The stem is erect, green, round, striate and covered with sparse white hairs, that are beautiful objects under a microscope. Each stem that attains the usual size is branched about the middle with several ascending branches, axillary from the leaves, and ending each in a spike of flowers. The branches are always much shorter than the main stem.



FIG. 127
Magnified portion of the stem showing branched hairs.

The leaves are alternate, mostly sessile, or the lower short stalked, and slightly decurrent down the stem; they are obvate or oblong, usually an inch to two long and half as wide, varying smaller till they merge on the upper part of the stem into flower bracts; they are of a

*The paging from this (63) conforms to that of the original article in "Drugs and Medicines of North America."
—J. U. L.

light green color, downy on both sides and soft to the touch. The veins are numerous, projecting below the leaf and impressed in the upper side of it. The margin is erosely blunt-toothed, the teeth tipped with small glandular white tips.

The flowers appear in August, the first to open axillary to the upper leaves which become successively smaller, passing into the bracts of a terminal raceme. The flowers themselves are rather inconspicuous being only about a quarter of an inch long. They are borne on short, erect peduncles about the length of the calyx lobes.



FIG. 128.

A flower of *Lobelia inflata*, (enlarged.)

of all the species of *Lobelia*; the upper lip consists of two erect, narrow lobes, the lower of three sub-equal, broad reflexed segments. The stamens are five and cohering together, both filament and anther, around the pistil, form a column the length of the corolla tube and slightly projecting from the split in this tube. The pistil consists of a two-celled, inferior ovary, containing numerous minute ovules attached to the large central spongy placentas, and completely filling the ovary when in flower. The style is enclosed in the tube formed by the stamens, and ends in a small two-lobed stigma.

The fruit-pod is a peculiar shape, as shown in our figure 129. It is about a quarter of an inch long, inflated, sub-globular, compressed laterally, and unequal at the base,



FIG. 130.

Transverse section of a pod of *Lobelia inflata*.

the cell opposite the stem being longer at the base than the inside cell. This is characteristic of the fruit.* The pod is prominently ten veined lengthwise with numerous, intermediate, net veins. It is crowned with the five persistent linear calyx segments, which on the unripe pods are nearly erect and slightly more than half the length of the pod; the sides are very thin and easily compressed. The pod is very much inflated, (whence the name of the plant,) and is divided lengthwise into two cells by a thin partition; it contains an axial two-lobed,

The calyx is adherent, with a globular ribbed tube and five slender, linear, sub-equal, erect teeth, which are nearly as long as the corolla. The corolla is small, bilabiate, and of a light blue color; the tube of the corolla is split the entire length on the upper side, a characteristic



FIG. 129.

A fruit-pod of *Lobelia inflata*, (slightly enlarged.)

*Bentley & Trimen's illustration of the pod (fig. 6, plate 162, also of the pods on the stem) is inaccurate, as it represents the pod equal at the base, and large at the apex tapering to the base, (club shape,) which is not the case.

comparatively large, spongy placenta, which is densely covered with the numerous minute seeds. The description and illustration of the seeds are given in our description of the drug.

COMMON NAMES.—The drug is now known to the drug trade as Lobelia or Indian Tobacco.

A number of names have been applied to the plant, mostly in old works. The earliest botanists did not use a common name for it. Aiton, (1810,) calls it Bladder Pod, and this name with Inflated Lobelia and Bladder Pod Lobelia, are the natural translations of the specific name, hence, the ones used at first by botanists.

From its taste which resembles tobacco the plant began to be known as Wild Tobacco to the people, and this name was used in Eaton's first Manual of Botany, and carried through all the successive editions. From Wild Tobacco it is quite natural that it should acquire the name Indian Tobacco, as it would be presumed a tobacco that was wild would be used by the Indians. As a matter of fact, however, we have no record that the Indians ever made use of the plant in the manner of a tobacco. Dr. Carver, who spent a greater part of his life among Indian tribes, and, who wrote a list of the various economic plants used by them, does not mention the plant. Indian tobacco began to be applied about 1814, (Biglow,) but did not come into general use, outside of medicine, until adopted in the botanical class books; first, by Beck, 1833; then Wood, 1845, and Gray, 1848. At the present time it is the only common name applied to the plant, either in medicine or botany.

On the introduction of the plant to medicine a new series of common names, denoting its properties were originated.

Thomson and Cutler, who first brought the plant to general attention, called it Emetic weed, and from this name Puke weed, Vomit weed, and Gag root, have been suggested and used.

We find the name Asthma weed applied by a few writers, and in very old works, Eye-bright. In our article on the medical history will be found further remarks in connection with this subject.

BOTANICAL HISTORY.—GENERIC.—The genus Lobelia is a very large family of plants, distributed mostly in tropical and sub-tropical countries, and a few found in temperate and even frigid zones.

They are characterized by a uniformity in the structure of the flowers and fruit, but differ widely in general habits, which has given rise to a number of sections, considered distinct genera by various authors.

Plants of this genus have all milky juice, a five-lobed calyx, an irregular two-lipped corolla with the tube slit along the upper side, and five anthers united around the style. To a mere novice in botany, plants of this family can be recognized by the very peculiar split corolla and the united stamens.

The position of the genus in the natural system is obviously near the great family Compositæ, and has so been placed in all systems of classification. The genus agrees with the family in the trifold style, the anthers united around the stigma and the adherent ovary; with the tribe Cichoraceæ in having milky juice and the corolla split, the segments cohering together in one piece; with the

tribe Mutisiaceæ in having labiate flowers:* it differs in having the flowers not collected in an involucrate head, which at first makes them appear very different, and in the character of the ovary.

The genus *Lobelia* has always been considered a type of a natural order, *Lobeliaceæ*, established by Jussieu, 1811,† and maintained by Endlicher, De Candolle, and most systematists, including all writers on American botany, even Dr. Gray in his very recent work, 1878.‡ By Bentham and Hooker, however, 1876,§ these plants are included as a tribe *Lobelieæ*, of the natural order *Campanulaceæ* and we have followed these authors to give uniformity to our work, theirs being the last general work on plant classification that has been published.||

In old times plants of this genus were described in common with widely different ones under the family name of *Rapunculus*. It was Tournefort, who first clearly defined the genus in 1719,¶ giving it the name *Rapuntium* and as his genus is very natural and most of the species are still retained, it is unfortunate that the name has been replaced. The history of the present name of *Lobelia* is as follows: In 1703 Charles Plumier** in his work on plants of the West Indies,†† dedicated to his friend Matthias de Lobel,‡‡ a genus founded on a plant collected in the West Indies. Linnæus referred this plant to Tournefort's genus, *Rapuntium*, and adopted the name *Lobelia* for the genus, probably because it was the prior name. Afterwards, when his attention was directed to the fact, that under the name *Lobelia*, a large number of plants were included entirely distinct from the original plant described by Plumier, Linnæus deemed it best to retain the name for the plants to which it had become most generally known and to originate a new name for the genus of Plumier.‡‡

*It is a fact, not generally known to our botanists, because their attention is not directed to it by any common native plants, that a large section of the *Compositæ*, consisting of over fifty genera of South American and African plants, are chiefly characterized by having bilabiate corollas. We have in our Southern States a single species (*Chaptalia tomentosa*, Vent.) that belongs to this section.

†Mémoire sur les *Lobeliacées* et les *Stylidiées*, nouvelles familles des plantes, A. L. de Jussieu, *Annals des Sciences Naturelles*, Paris, vol. xviii, 1811.

‡Synoptical Flora of North America, Asa Gray, New York, 1876, vol. ii., part 1, page 2.

Dr. Gray says on this subject: "Too near the *Campanulaceæ* and nearly passing into them, therefore united by recent authors; but as there are two dozen genera, agreeing in the indefinite inflorescence, irregular corolla and mostly in the syngenesious anthers, it seems best to retain the order."

§Genera Plantarum, Bentham and Hooker, vol. ii., (part 2, 1876,) p. 551.

¶We will state in this connection that we think the family a perfectly natural one, and distinct from the *Campanulaceæ*. Indeed, any one will have more trouble in finding points of resemblance than points of difference between the two sections.

While we would like to follow all American authority, the *Pharmacopœia*, all our medical works and our own views in considering the family distinct still, we think it better to adopt the classification of Bentham and Hooker, acknowledging them as the present botanical authority on the classification of the plants of the world.

¶¶Institutiones Rei Herbariæ, J. P. Tournefort, Paris, 1719, p. 163, plate 51.

**See note *, p. 21. Plumier was the first to honor living persons by introducing their name into scientific nomenclature. The plan met with much opposition at first because it was liable to be abused, and names of persons selected, who's scientific labors do not entitle them to this distinction. It has been adopted by many of the most eminent botanists.

††Nova Plantarum Americanarum Genera, P. Carolo Plumier, Paris, 1703, p. 21 and plate 31.

‡‡Matthias de Lobel (Matthias de l'Obel as the name is originally spelled) should be classed among the early English botanists. He was born in 1538 at Lisle in the north of France and was educated at Montpellier in the south of France, and traveled over Italy, France, Germany, finally settling near London. By profession he was a physician, and at one time he was physician to William, Prince of Orange. His chief reputation, however, is as a botanist, this study seeming to occupy most of his time. In 1570 he published at London a small work entitled "*Stirpium Adversaria*" which professed to investigate the botany and materia medica of the ancients, especially of Dioscorides.

A second edition of this work in 1605 contained an addition on new remedies, rare plants, etc., and in this work the first glimpse of a natural system of classification can be seen. It was necessarily very crude and imperfect, and consisted merely in grouping together such plants as seemed to accord in appearances or habits, without however defining the groups, or making any allusion whatever to the system. Some of the groups such as leguminous, grasses, etc., are quite natural and have continued to the present day, others, as could be expected, are very incongruous.

The work was printed in Latin and on this account was little known to the common people.

For the times in which he lived, Lobel was a most learned man in botany and the leader in this science. He styled himself (on one of his title pages) "botanist to king James I.," which has no doubt been the source of the erroneous statement published in several encyclopædias that he was "physician to king James I."

Lobel died in 1616, aged 78 years.

‡‡‡This genus is *Scævola*, established by Linnæus, and referred to the natural order *Goodenoviæ*. The genus has a cleft corolla tube, similar to *Lobelia*, which no doubt led Linnæus to originally place them together, but the

BOTANICAL HISTORY.—SPECIFIC.—The original collector of *Lobelia inflata* is not known, but it was evidently sent to Europe early in the last century. The first authentic mention we can find of it is by Linnæus (1737)* in his catalogue of the plants in the garden of George Clifford,† hence, it was evidently in cultivation at that time. It is probable that Tournefort also refers to this plant, (1719,‡) but we can not say with certainty.

Previous to the appearance of Linnæus's‡ "Species Plantarum" (1753,) the plant was specified by a number of descriptive adjectives.¶ Linnæus named it *Lobelia inflata* from the inflated seed-pods which name it has retained to the present day with the single synonym of *Rapuntium inflatum* given to it by Miller, but used by no one else.

DESCRIPTION OF THE DRUG.—In commerce two products of the plant are found, the entire dried herb and the dried seed. The former only is official, but the seed is a distinct article of trade, and very largely used.¶¶

Lobelia Herb.—As found in commerce this drug consists of the stems, leaves, and inflated capsules of *Lobelia inflata*. Usually the plant is gathered after the lower leaves have changed to brown and often the seeds have fallen from the lower capsules, which are then also brown. The plant is cut off just above the ground and the lower portion of the stem is generally devoid of leaves even in the carefully selected recent drug. Sometimes the plant has been known to appear so abundantly over an old field as to permit of its being mown with a scythe,** then the drug consists of straight, few branched stalks, from six to twenty-four inches long. If culled from moist situations along the banks of streams, the plants are more robust, branched and bushy.

Farmers often gather little lots of lobelia and then the entire plant is sold. Root and herb collectors on the contrary understand that the seed commands a

fruit is very different, being in *Scævola* a fleshy drupe containing a single large seed. Plumier's plate shows quite plainly the nature of the fruit which would exclude his plant from the present genus *Lobelia*.

In thus transferring a generic name from the original species to which it was given, to a family to which it had become attached we find an analogous case in the name *Magnolia*. (See note,† page 21.)

**Lobelia caule erecto brachiato, foliis ovato-lanceolatis obsolete incis, capsulis inflatis.*—Linnæus, Hortus Cliffortianus, 1737, page 500.

It is not stated whether the plant was growing in Clifford's garden at that time, or whether it was merely preserved in his herbarium, as the Hortus Cliffortianus describes both plants of his garden and dried collection.

†George Clifford was a wealthy banker, who resided in Amsterdam in Holland at the time of Linnæus. He was not a close student of natural science, but having a liking in this direction and abundance of means he established an extensive private garden, obtaining the most rare and expensive exotics.

Becoming acquainted with Linnæus, who was at that time in straitened circumstances, and recognizing his talents, Clifford employed him to study and superintend his garden, giving him a liberal salary.

For the first time in his life, Linnæus had now leisure and means to pursue his studies, unembarrassed with the necessity of struggling for a living and the result was the great systematic works that have made his name famous.

For three years Linnæus remained at Amsterdam and published the Hortus Cliffortianus, a magnificent work, enumerating all the plants that were in the garden or collection of his patron. Some idea of the wealth and liberality of George Clifford may be obtained from the fact that this expensive work, of over 500 folio pages and numerous plates, was only distributed gratuitously to his friends and correspondents.

A genus of shrubs, *Cliffortia*, of the Cape of Good Hope, commemorates his name.

‡"*Rapuntium Americanum, Virgæ aureæ foliis, parvo flore subcæruleo.*"—Tournefort, Institutiones Rei Herbariæ, Paris, 1719, p. 163.

§Species Plantarum, 1st edition, 1753, page 931.

¶*Lobelia caule erecto, foliis ovatis subserratis, pedunculo longioribus, capsulis inflatis.*—Linnæus, Hortus Upsaliensis, 1743, p. 276.

See also note * above.

¶¶The powdered herb was known to Thomsonians as *green lobelia*. The powdered seed as *brown lobelia*.

***Prof. A. J. Howe relates to us an instance in which several tons were cut at one time from an old wheat field about a mile from Worcester, Mass., on the road to New Worcester.

better price than the herb, and they thresh out the seed, break or chop up the stalk, and sell the seed separately. Thus it happens that the larger part of the lobelia herb of commerce is devoid of seeds, and is in a broken condition. As a rule, the leaves and capsules are of a green color, the upper capsules being especially verdant.

No substitution for *Lobelia inflata* herb or adulterant is gathered, of which we are aware, nor is any probable. *Lobelia cardinalis* and *Lobelia syphilitica* are such different appearing plants they would be easily detected, and the other native and more closely allied species are so small and mostly rare that it would not be profitable to collect them.

According to the *Pharmacographia* the drug used in England is mostly imported packed in ounces.*

Some writers assert that the root of *Lobelia inflata* is employed. This is a mistake, and first made by confusing *Lobelia syphilitica* with this plant. The root of *Lobelia syphilitica* was employed before *Lobelia inflata* was known to medicine, but the root of *Lobelia inflata* has never been used.

All parts of *Lobelia inflata* contain an acrid alkaloid (see Constituents, page 73,) which produces a painful irritation upon inhaling the dust of any portion of the plant. All parts of the herb, and the seed, produce an acrid biting sensation on the tongue, and a sharp tobacco-like impression in the throat and fauces. The milky juice of the green plant is intensely acrid, owing perhaps to the more soluble condition of the alkaloid. This juice is so violent that an amount so small as to refuse to affect a balance sensible to the one-thousandth part of a grain, produces a sharp tingling sensation upon the tip of the tongue. Upon drying, this juice becomes very much modified, but not by the escape of a volatile alkaloid.

The first published description of *Lobelia inflata*† states that the leaves if chewed "produce giddiness and pain of the head, with a trembling agitation of the whole body," and this sentence with little variation has passed through a multitude of works on materia medica.‡ It has not been our experience to note a giddiness of the head, the sensation with us is simply a tobacco-like irritation until nausea, headache and vomiting occur, and this is the report of others, who we know to be familiar with the drug.

Lobelia Seed.—This drug presents a deep brown color in mass. It consists of minute, almost microscopic seed. Their actual size is about 1-60 of an inch in length by 1-240 of an inch in diameter. The typical seed is oblong, rounding at the ends, and cylindrical. Sometimes they are nearly round, however.

*"The herb found in commerce is in the form of rectangular cakes, 1 to 1¾ inches thick, consisting of the yellowish green chopped herb, compressed as it would seem while still moist, and afterwards neatly trimmed. The cakes arrive wrapped in paper, sealed up and bearing the label of some American druggist or herb-grower."—*Pharmacographia*, 1879, p. 399.

†Account of Indigenous Vegetables.—Cutler, 1785.

‡The original description of a drug seems to be authority with many writers who neglect to give proper credit to the real author, and, who seem not to display much personal knowledge of the subject.

The average number of seeds in a capsule is between 450 and 500. It requires 2500 seed to make one grain in weight.* Upon microscopic examination, each seed is shown to be a beautiful object, bright and glistening, the surface being a corrugated ridge-like network, of which figure 131 is a representation.

Lobelia seeds are odorless, but upon handling them a fine dust rises that is very irritating when inhaled. They possess the acidity of the plant in an intensified degree, and were considered by the Thomsonians to possess one-half more strength (emetic) than the powdered leaves.

Lobelia seed have never been officinal, but are in good demand in the American drug market, and, extensively employed by Eclectic physicians who consider that the preparations of the seed are more uniform and reliable than those of the herb. Our experience is to the same effect.

No adulterations or sophistications are known to us, although often fragments of the leaves and capsules are present, not being separated by sifting through fine enough sieves. The commercial term for the drug free from this chaff is "clean lobelia seed."

The corrugated surface of the seed is a characteristic of the species of Lobelia, and would serve to individualize them. It would be possible to substitute the seed of other species, *Lobelia syphilitica*, and perhaps *Lobelia cardinalis*. We made a careful comparison under a microscope of the seed of *Lobelia syphilitica* and *Lobelia inflata* and were unable to note any difference either of size or marking.

We are not aware that the substitution is ever made by collectors, but it could be done with profit to them as the *Lobelia syphilitica* produces seed in abundance and is a common plant and easily collected.

Fortunately, however, the plants are so different in all appearances that ignorant collectors have no idea that they are at all similar and the substitution is not suggested to them.

MICROSCOPIC STRUCTURE OF LOBELIA INFLATA.—(Written for this publication by Robt. C. Heflebower, M. D.)—Transverse and longitudinal sections of the stem of the plant show first the epidermis. (See fig. 132, plate xxxv. and fig. 136 following page.) This consists of a single layer of cells, and supports the hairs found upon the surface of the stem. Beneath this layer are several other layers of cells, (a. figures 132 and 136,) mostly oval upon transverse, and elongated upon longitudinal section. The cells of this layer are not all closely approximated, but there is a small space existing between some of them, whilst others are intimately joined. The latter is usually the case.



FIG. 131.
Seed of *Lobelia inflata*.
(Magnified.)

*Thus, a pound will contain 17,500,000 seed. The business firm with which the writers are connected, purchased recently in one lot 2000 pounds of lobelia seed. By our calculation this amount contains the enormous number of 35,000,000,000 individual seed.



FIG. 136.
Longitudinal section (parallel with diameter)
of one side of a stem of *Lobelia inflata*, *a*,
epidermis; *p*, parenchyma; *b*, medullary ray
of wood; *c*, tracheæ; *d*, pith; (magnified
300 diameters.)

Lying to the inner side of these outermost strata is the parenchyma of this portion, (*p*. figures 132 and 136.) It consists of numerous cells, elliptical in outline, arranged in from five to seven layers around the entire stem. In many places these cells appear irregular in form, this irregularity being caused by pressure from adjoining cells.

The woody structure of the plant (*b*. figures 132 and 136) is comparatively thick, and forms distinct medullary rays and interspaces.

Towards the pith, at the center of the stem, are the different vessels of the plant, the lactiferous tubes (*c*. figures 132 and 136) and the tracheæ. The structure at this portion is complicated, but the tracheæ are easily seen. They consist chiefly of spiral and annular vessels, the markings of which are very beautiful. Some pitting of the cell walls is also present. The lactiferous tubes are of the articulated variety, and by means of branches extending from one longitudinal tube to another, form a reticulated anastomosis.

The pith, (*d*. figures 132 and 136,) situated at the center of the stem, consists of a mass of loosely arranged cellular tissue, formed of numerous elongated cells, which, by transverse section, give an oval, a polygonal or a round outline.

There are also other epidermal structures besides those already mentioned. These are the hairs found upon both the stem and the leaf, the stomata of the leaf and the arrangement of the epidermal cells around such hairs and stomata.

The hairs upon the stem are simple and compound. The simple hairs project directly from the epidermis of the stem, and are unicellular of an elongated conical shape, having a base or attached portion, and an apex or free portion. The compound hairs (see fig. 127, page 63) arise by a single trunk, from which project several branches. These branches resemble the simple hairs.

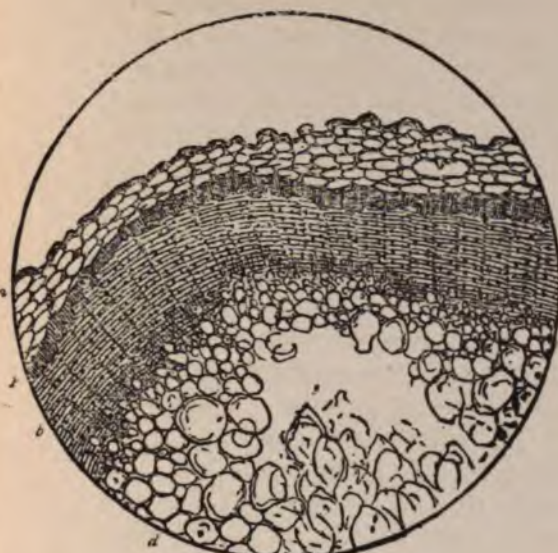


FIG. 132.

Transverse section of the stem of *Lobelia inflata*.—*a*, epidermis; *b*, parenchyma; *c*, woody portion, containing medullary rays; *d*, tracheae and lactiferous tubes; *e*, pith. (Magnified 108 diameters.)

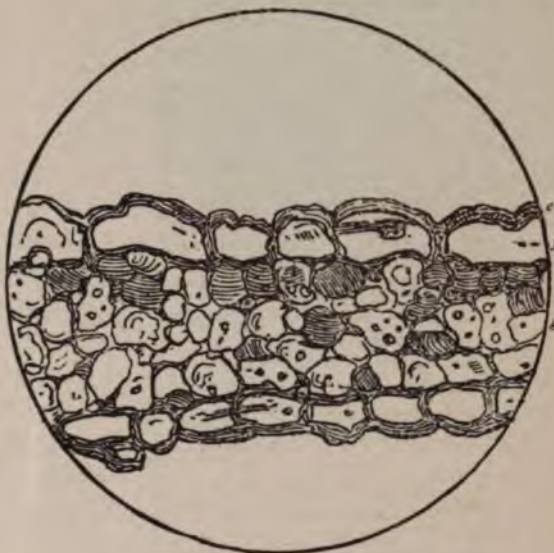


FIG. 135.

Transverse section of a leaf of *Lobelia inflata*.—*e*, cuticle; *f*, epidermal cells; *g*, parenchyma. (Magnified 300 diameters.)



FIG. 133.

Upper surface of a leaf of *Lobelia inflata*.—*h*, unicellular hair; *j*, subsidiary cells at base of hair; *i*, chlorophyll granules; *n*, epidermal cells. (Magnified 108 diameters.)



FIG. 134.

Lower surface of a leaf of *Lobelia inflata*.—*k*, epidermal cells; *s*, stomata; *h*, hair; *j*, subsidiary cells at base of hair. (Magnified 300 diameters.)



The epidermes of both surfaces of the leaf present cells bounded by irregular outlines and hair structures. The cells of the upper surface (see figure 133) are larger, and their walls thicker, than those of the under surface. The same is also true of the hairs of this surface.* The under surface (see fig. 134) presents in connection with the simple epidermal hairs and cells, numerous stomata, (see s. fig. 134.) Each stoma is widely elliptical in shape, and consists of a pore or longitudinal slit, and the guard or stomatal cells which bound the pore. Outside of the guard cells are several epidermal cells surrounding the stoma, the subsidiary cells of the stoma. The base of the hair is likewise surrounded by a similar cluster of cells, the subsidiary cells of the hair.

A transverse section of a leaf of *Lobelia inflata* (see fig. 135) presents the epidermis of each surface beneath the cuticle, and the parenchymatous structure between the two epidermal layers. The cells of the parenchyma are filled to a greater or less extent by chlorophyll granules.

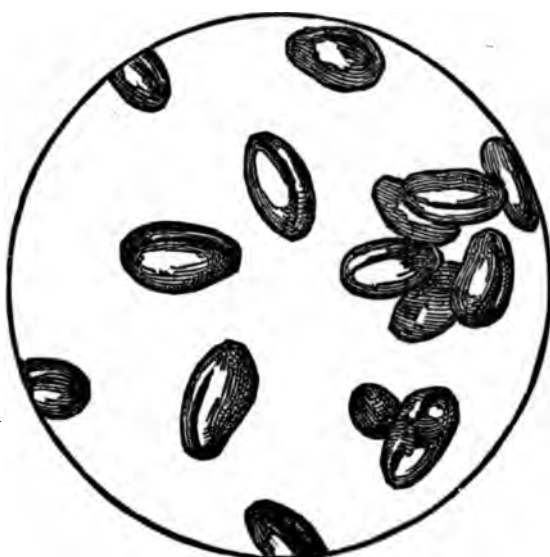


FIG. 137.

Pollen of *Lobelia inflata*, (magnified 690 diameters.)

The pollen grains are ovoidal in form and resemble a wheat grain, having a longitudinal slit on one side dividing the grain into lateral halves.

CONSTITUENTS.—*Lobeline*.—The characteristic principle of *Lobelia inflata* is an acrid, irritating alkaloid, that pervades all parts of the plant; most easily obtained from the seed. It is known as lobeline.

It exists in combination with an unimportant vegetable acid. If freed while in contact with other constituents of the plant the alkaloid decomposes in a short time. If heat is applied to an aqueous solution of the natural constituents, this decomposition occurs rapidly and the alkaloid soon disappears.† Heat applied even to an alcoholic tincture accomplishes the rapid destruction of the alkaloid.

In a recent experiment whereby we evaporated in a close still the alcoholic tincture of fifty pounds of *Lobelia* seed, and extracted the residue with acid-

*The apparent contradiction to this statement of our figures, number 133 and 134, is from the latter being more highly magnified.

†This fact was well known to the Thomsonians. They used but little heat, and throughout their literature we find constant reference to the loss of strength by boiling. Indeed, they wisely preferred to give both the herb and seed *in substance*. Empiricism demonstrated what chemistry supports.

ulated water, having neglected to add the acid to the alcohol, most of the lobeline perished. In another experiment, by an oversight, heat was applied to an aqueous solution of the alkaloid, while it was associated with other constituents of the plant and the alkaloid entirely disappeared.*

History of Lobeline.—Prof. S. Cohoun, 1834,† made the first examination of *Lobelia inflata*. He obtained by means of acidulated alcohol, a colored liquid that he took to be the characteristic principle, which however was simply a crude extract containing a salt of the alkaloid. He described it as follows: "The active principle of this plant is a brown, molasses-like fluid."

Prof. Wm. Procter, jr., 1838,‡ made *Lobelia inflata* the subject of his thesis. This was the first creditable chemical investigation of the plant. By a number of experiments he fairly demonstrated the presence of a volatile oil destitute of acrimony (exp. 4,) an alkaline body, soluble in ether, (exp. 10 and 11,)§ which is capable of forming salts with acids, (exp. 12.)||

Again, 1841,¶ Prof. Procter reconsidered the subject and obtained the alkaloid lobeline as a yellow, oily liquid, but he states, "if the process of purification were repeated, there is little doubt but that the lobeline would be obtained perfectly colorless."

Reinsch, 1843,** obtained a substance that he called *lobeliin*, but which was not a definite body.

W. Bastick, 1851,†† attempted to clear up the *lobeline* record, but was far from being successful, and added little if anything thereto. He obtained Mr. Procter's impure alkaloid by employing Liebig's process for making hyoscyamine.

Mayer, 1865,‡‡ in considering the "Principal Reactions of the Medicinal Volatile Bases" records the action of lobeline, classing it with the volatile alkaloids known at that day. In our opinion lobeline is not a member of the class (volatile) he investigated.

In 1871,§§ Enders extracted lobelia with alcohol and distilled the liquid in presence of charcoal, washed the charcoal with water and extracted it with alcohol which yielded warty tufts, slightly soluble in water, brown, acrid, and uncrystallized. Soluble in chloroform and ether. He gave it the name *Lobelacrin*, but we find it to contain the substance we designate as *inflatin* and a little of the alkaloid lobeline.

W. D. Richardson, 1872,||| found that upon exposure, lobeline underwent a change whereby it became insoluble in water and refused to form salts, but the nature of the alteration was undecided.

Mr. W. H. D. Lewis, 1878,¶¶ reviewed the literature on the lobeline subject, and suggested a modification of preceeding processes, whereby he obtained lobeline of a honey-like consistence and light yellow color, but evidently impure, as it had "a somewhat aromatic odor." He decided that lobeline exists in the plant in combination with lobelic acid, and affixed to this salt the name *lobeliate of lobeline*, but, this substance, (whatever it may be,) had previously been obtained by Procter.

Dr. H. Rosen, 1886,*** obtained lobeline by making a benzin solution from the acrid infusion, and another alkaloid as he thought by after treatment of this liquid with chloroform. He decided

*Here again the Thomsonians learned from experience. They used *acetic acid* to make their most stable preparations.

†Prof. S. Calhoun, M.D., was Professor of Materia Medica in Jefferson Medical College, Philadelphia, at the time he wrote this paper.

‡Am. Journ. Pharm., 1838, p. 98, illustrated.

§He erroneously gives to this a strong odor. The odor was due to impurities.

||In 1840, (Am. Journ. Pharm., p. 280,) Prof. Procter examined *Lobelia cardinalis*, obtaining an impure alkaloid, of a bitter taste. It formed salts with acids.

¶Am. Journ. Pharm., 1841, p. 1.

**Pharmacographia, p. 400.

††Pharmaceutical Journ. and Trans., 1851, p. 270.

‡‡Proceedings of the American Pharmaceutical Association, 1865, p. 211.

§§Pharmaceutischer Central-Blatt, No. 31, July 5, 1843.

||Inaugural Address, Am. Journ. Pharm., 1872, p. 292.

¶¶Pharm. Journ. and Trans., London, 1878, p. 561. Mr. Lewis was a member of the Pharmacy class of the University of Michigan at the time he wrote the paper.

***An Inaugural Dissertation, University of Dorpat, 1886, communicated to the Am. Journ. Pharm., 1886, p. 392. His paper was on *Lobelia nicotianaefolia*, but he states, "the same two alkaloids were also obtained from *Lobelia inflata*."

that the latter alkaloid presented striated prisms. His investigations were evidently performed with small quantities from which possibly he failed to separate impurities.

Résumé.—Thus it is that, although much time and attention have been given to the lobelia constituents, the result is far from satisfactory. In our opinion, the chemistry of the subject is yet obscure. We have followed the various processes and obtained the acrid alkaloid, amorphous, colorless, intensely active, one drop of its solution immediately vomiting a strong man, but we have not crystallized either the pure alkaloid or a salt of it. We obtained crystals from the impure alkaloid *lobeline*, as others had and for some time accepted that they were the corresponding salts, but further (recent) examinations enabled us to eliminate the crystalline material entirely, leaving the alkaloid as an amorphous product.* That we were for a while deceived is evident, that others may also have been misled is possible. For the present we shall simply call this crystalline substance *inflatin*,† and are led to make this introduction before referring to the preparation of lobeline.

Preparation of Lobeline.—Extract the oil from powdered lobelia seed, by means of benzine, and dry the residue. Then acidulate the dry powder with a mixture of acetic acid one part, alcohol nine parts, and pack firmly in a glass percolator. Exhaust with a menstruum made of acetic acid one part, alcohol twenty parts. Evaporate the liquid, and when cold, add water enough to make a thin syrup, and extract the alkaloid from it by means of ether, adding cautiously ammonia‡ to slight alkaline reaction. The ethereal liquid is then to be decanted, evaporated in presence of water that has been previously acidulated with acetic acid to excess. The watery layer is cooled, separated from overlying oil, filtered, and again extracted with ether to which ammonia is again cautiously added to slight excess. This ethereal liquid will be colorless (if not so repeat the operation) and it contains the alkaloid *lobeline*. It has been supposed to contain *only* the alkaloid, but, in addition there is a volatile oil and inflatin.

If this ethereal solution is evaporated, a colorless glassy layer remains, of a strong odor, and which turns yellow and even brown upon exposure. It is partly soluble in acidulated water,§ yielding the alkaloid, mixed with various amounts of the associated impurities. It dissolves in alcohol, ether and chloroform, but only incompletely in benzol and carbon disulphide.

If the ethereal solution is evaporated in contact with acids (excepting acetic acid) an amorphous layer usually interspersed with crystalline formations remains. These crystals we formerly took to be *salts of lobeline*, even drawing fig. 138 under the impression that it was a sulphate. If this crystalline layer be extracted with carbon disulphide,|| the crystals disappear¶ and the acrid material remains. If now, the residue (a salt of lobeline) be exposed to the dry atmosphere for a few days, it becomes odorless from escape of the volatile oil. Then, it will dissolve in water, especially if slightly acid, and after filtration can be extracted colorless and as we now believe pure, by sulphuric ether in connection with a slight excess of ammonia.**

Properties of Lobeline.—Lobeline is alkaline in reaction, colorless, odorless, soluble in alcohol, chloroform, ether,†† benzol, carbon disulphide, and somewhat soluble in water. We have not suc-

*We simply state that ~~we~~ were misled. The crystals that we obtained were not of lobeline, but an impurity that intimately accompanies it and crystallizes more easily under the influence of acid liquids. Our crystals compare too, with Procter's description.

†We dislike to affix a name to a body that is so obscure in its classification as this now is. We find also that the various forms of the word *lobelia* is entirely monopolized. Hence, we reluctantly select *inflatin* for want of a better name.

‡Some use magnesia, thinking that ammonia decomposes the alkaloid. Any alkali and heat will do so, but dilute ammonia in presence of ether does not alter it in appreciable amounts. Magnesia does not entirely decompose the salt (acetate) and a free alkali is necessary.

§It does not necessarily follow that because this body was once entirely dissolved in acidulated water, it will completely redissolve after being dried.

¶We think that former investigators failed to brake up this mixture by using ether and alcohol only as solvents. These liquids dissolve the entire associated products, and acid water will also do so to an extent, although pure inflatin is insoluble in water.

¶See inflatin, p. 76.

**We make no claim to originality in the method of making lobeline. Our process differs somewhat from others it is true, but, perhaps not materially. The aim is to divest the seeds of their oil, extract the alkaloid in stable condition and eliminate impurities without the application of more chemistry than is necessary.

††Wittstein in his *Organic Constituents of Plants* states that lobeline is insoluble in ether. This is a mistake.

ceeded in crystallizing it. It is not hygroscopic (Wittstein contra.) In pure condition lobeline can be exposed to the air for days, and is probably permanent. We evaporated by exposure, a solution in water rendered strongly alkaline by ammonia,* which changed to yellow, showing some decomposition, but which retained all the sensible properties of the alkaloid, remaining very acrid and being a violent emetic.

Lobeline turns red with sulphuric acid, yellow with nitric acid and dissolves colorless in hydrochloric acid. Heated with sulphuric acid it turns black; with nitric acid evolves the usual vapors of nitric oxide, with formation of a yellow liquid; and hydrochloric acid evaporates from it unchanged.

Salts of lobeline are very soluble in water and those we have examined dissolve in alcohol and ether, but very slightly (excepting the acetate) in carbon disulphide.†

From moderately strong aqueous solutions of the salts of lobeline, alkali precipitates the alkaloid, white, flocculant, amorphous and odorless. This precipitate dries to a glassy layer that will powder white,‡ but this must be cautiously performed as minute amounts of the dust excite violent irritation of the nostrils, air passages and lungs, equal to, if not more intense than veratrine.

All the alkaloidal reagents precipitate lobeline from aqueous solution of its salts.

We have as yet failed to crystallize salts of pure lobeline, but we think that such a positive alkaloid will furnish crystals under proper conditions.§

Lobeline and its salts are among the most powerful of emetics, and extremely small amounts of the solution of the colorless alkaloid, (one drop being placed on the tongue) *immediately* vomited those to whom we administered it. There was no unpleasant after effect (see medical properties.) In the crude condition, as former investigators have obtained it from ethereal solution (even colorless as we made it) decomposition occurs and it rapidly darkens.

Résumé.—The alkaloid lobeline has evidently been impure as heretofore described, and may not be pure as we obtain it. Others state that it is yellow and has an odor; this certainly is erroneous for we produced it colorless and odorless. Others have obtained what was considered crystalline salts; we also formerly thought this easy, but found the crystalline material to be an impurity, to which we can find no previous reference. It has never been analyzed, but, if our present line of manipulation is successful, further remarks will follow, and a combustion made by recognized authority.

Having considered the most prominent constituent of lobelia, we shall now pass to the most characteristic principle which as before stated we have for descriptive purposes designated as inflatin.

Inflatin.—This substance exists ready formed in lobelia herb and seed, and may be extracted together with the fixed oil and chlorophyll by means of carbon disulphide. Since the oil passes with the inflatin through most solvents and holds it in solution when the other solvents are evaporated, it is not feasible to separate inflatin from the extracted oil, although, we have obtained it by saponifying the oil and separating the soap.

Inflatin has certainly been obtained by the investigators who produced crude lobeline, beginning with Prof. Procter, but owing to its intimate association with that alkaloid, and with the volatile oil of the plant, and to its refusal to crystallize while associated in this manner it has been overlooked.¶

The glassy layer first obtained in the evaporation of lobeline from the ethereal liquid, if moistened with acid solutions will upon drying assume a partly crystalline condition. This led us

*It is stated that alkalis destroy lobeline at once. This is incorrect.

†This solvent which seems to have been overlooked by others enabled us to purify the crude lobeline as already stated and as further explained under inflatin.

‡This differs from statements of others, who describe it as an oily liquid.

§Sulphate of lobeline is quoted in commerce. We see no reason for presuming that if demanded in quantities it should not be crystallized. We also think that manufacturers who have a demand for the alkaloid should have been able to exclude the crystalline substance that we have found to accompany it.

¶Even if it has crystallized, the solvents formerly employed redissolve both it and the associated principles.



FIG. 138.

Inflatin (at first supposed to be sulphate of lobeline) crystallized from in a few hours into small white warty aggregations, perhaps (if very impure) ethereal liquid.

imbedded in a viscid, tenacious, more or less yellow semi-liquid. These globules are *inflatin*, destitute often of crystalline form because of the pressure of the surrounding medium. Occasionally an isolated globule like *a*. fig. 139 will resolve itself into a fragment like *b*. fig. 139, and we have seen these globules under the microscope become crystalline strata without change of shape.



FIG. 139.
Globules of inflatin; *a*, the ordinary crude form; *b*, same, partly crystalline.

Carefully drop carbon disulphide on this layer and decant it at once into a clean glass as soon as it has taken up the globules, which will be, before the yellow substance dissolves. As the carbon disulphide evaporates crystalline nodules will form. The crystals do not form as distinct, however, as if the product is redissolved in pure benzol and evaporated.

Thus purified the crystals may appear like figures 140, 141, 142 and 143, dependent on the rapidity of the evaporation and depth of the liquid. Where the liquid is very thin, we observe a display like figure 140; if deep they will appear like figure 141; if deep enough to permit the typical crystal to form, they will mostly be diamond shaped† as shown in figure 142.

Since we have discovered the characteristics of this material, we have obtained it easily as follows: Abstract the greenish oil from powdered lobelia seed by benzine, stopping the percolation

(see page 75) to conclude that the salt of lobeline had crystallized, and figure 138, as before stated was drawn under the supposition that it was a sulphate of lobeline. These crystals with varying conditions assume different forms, and hence, we were more easily misled when we used the several acids.

Preparation of Inflatin.—Evaporate in thin layers the ethereal solution of crude lobeline (obtained by process on page 75) adding hydrochloric acid to slight excess. To the sticky product before completely dry, add a few drops of carbon disulphide,* and after flowing it about decant the solution into a shallow vessel. Repeat the operation with successive portions of carbon disulphide, and mix the liquids. It is best, if working small amounts, to allow the preceding portion to evaporate each time before adding the other.

The final product will resolve itself in a few hours into small white warty aggregations, perhaps (if very impure)



FIG. 140.

Crystals of inflatin from a thin layer of benzol solution.

*This leaves the hydrochlorate of lobeline.

†The goniometer must be used to determine their exact crystalline form. They appear to us as our artist represents them.



FIG. 141.

Crystals of inflatin from benzol solution.

does not affect it, even the smallest crystals remaining sharp and distinct. Hot sulphuric acid decomposes it with formation of a black liquid.

Cold nitric acid has no action upon it, but develops the forms and angles of a crystalline layer under the microscope in magnificent distinctness, the centers of each crystal being pure white, and the ends jet black as shown by figure 143 *a*, developed from a slide of which 143 *b* is a part without the nitric acid. Upon heating with nitric acid inflatin melts without change of color, and upon evaporation of the acid, and resolution in benzol, crystallizes as before.

Upon boiling inflatin with Fehling's solution it turns brown, then black, but does not reduce the copper and does not dissolve.

Inflatin melts at 225° F., and at a lower temperature cools to a mass of crystalline structure.

Résumé.—From the preliminary examination that we have given this substance, we conclude that it is either a stearoptene or a vegetable wax, probably the former. Perhaps in mechanical suspension it produces the milky juice of the plant, but we did not discover it in time to examine the juice of the herb during its season. It is evidently of no medicinal importance, and, is of interest we think simply because of its association with the other constituents of lobelia.

Volatile Oil of Lobelia.—*Lobelianin.*—All parts of the herb of fresh lobelia are pervaded by a volatile oil of a strong pungent odor, but with little taste and no acidity. It was described by Procter, (see p. 74,) 1838, who found that the tincture of lobelia, or the herb, distilled with water gave a distillate of a peculiar odor. Pareira, 1840, gave it the name *Lobelianin*, and stated that it had an *acrid* taste, but, Procter, 1842, decided that he was mistaken on this point, and, our investigations support Prof. Procter.*

*We made a careful examination, distilling water from quantities of the herb, both fresh and dry, and we used the utmost care to avoid the passing over of spray with the vapor. The product gave simply (from the green herb) a volatile oil that could be separated by sulphuric ether, but it does not accumulate in amount sufficient to separate from the distillate unless the temperature be very low.

when the percolate ceases to pass of a green color, (this abstracts much inflatin also.) Dry the magma and extract it by means of carbon disulphide. Evaporate the carbon disulphide and cool the residue. It will crystallize to a magma of inflatin and a fixed oil. Place on bibulous paper and warm it, the oil is absorbed and the inflatin can be purified by crystallization.

Properties of Inflatin.—Inflatin is pure white and from carbon disulphide tends to form nodules of a crystalline structure or in great crystalline plates. The various modifications of the crystals are shown by figures 140, 141, 142 and 143. The typical crystal is diamond shaped and perfectly transparent.

Inflatin is odorless, tasteless and refuses to unite with acids or alkalis. It is insoluble in water or glycerin, but soluble in carbon disulphide, benzol, chloroform, ether and alcohol in the order we have given. Sulphuric acid

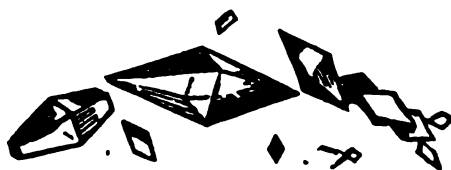


FIG. 142.

Crystal of inflatin, typical form.



FIG. 143.

Crystals of inflatin, *b*, before; *a*, after action of nitric acid.

It slowly evaporates upon exposure to the air and disappears.

Sulphuric and nitric acids dissolve it and upon heating a slide of crystals to which a drop of nitric or sulphuric acids had been respectively added, the nitric acid evaporated without apparent change, while the sulphuric acid blackened and evolved empyrematic vapors. It retains its crystalline form in ammonia water and liquor potassa.

We could not determine if more than one oil is obtained by the act of distillation, but, it is probable that such is the case.

We endeavored to obtain the substance we have called *inflatin*, by oxidation of this oil, but failed, although it is apparent that some constitutional difference exists in the volatile oil of fresh lobelia and that of dry. The oil of fresh lobelia did not crystallize in our hands.

Has Lobelia a Volatile Alkaloid?—

Prof. Procter, 1838,† found that both tincture of lobelia and the herb, with water, upon distillation gave a distillate of a peculiar odor,



FIG. 144.

Crystals of concrete volatile oil of lobelia, from benzol solution.

†American Journal of Pharmacy, 1838, p. 104, experiments 4, 5 and 6.

*Perhaps this name is inappropriate and should not be applied to a concrete volatile oil. However, it was first given by an authority we all respect and it has precedence.

†American Journal of Pharmacy, 1838, p. 104, experiments 4, 5 and 6.

but destitute of acrimony. Pereira, 1840,* stated that it had in addition an *acrid* taste, which Procter, 1842,† decided was a mistake. Bastick, 1851,‡ states that "lobeline is volatile."

We made a careful examination, distilling water from quantities of the fresh herb. We used the utmost care to avoid the passing of undistilled liquid with the vapor, and failed to obtain either an alkaloid or an acrid distillate.§ The product was of strong odor, from it sulphuric ether dissolved the oil, but there was no trace of acidity or of an alkaloid. Then we used dry fresh lobelia in ten pound lots, with water, and with water that was made alkaline with caustic potash. In both cases the distillate was free from acidity and refused to affect any alkaloidal reagent.

We made a solution of pure sulphate of lobeline, rendered it alkaline with caustic potash, and distilled it to one-third. The distillate gave evidence of decomposition products, but no lobeline came over.||

We therefore conclude that lobelia does not contain a volatile alkaloid, and that lobeline is not volatile. There is no reason that we can see to suppose that the alkaloid lobeline is chemically related to the alkaloid nicotine. That they have been associated is probably from the unfortunate name for lobelia, Indian tobacco, and the fact that the plants and alkaloids resemble in taste, and that both are emetic.

LOBELACRIN. (SO CALLED).—Enders, 1871,¶ obtained a substance that he named *lobelacrin*. It was produced by exhausting lobelia with alcohol, adding charcoal and distilling. The charcoal was washed with water, treated with boiling alcohol, the alcohol evaporated and the residue extracted with chloroform. Upon evaporation of the chloroform "warty tufts" of a brown color were obtained. This, Enders named *lobelacrin*. Lewis considered it perhaps a *lobeliate of lobeline*. We consider it a mixture of the oil (fixed) of lobelia, the substance that we have called *infatin*, a brown resin, some lobeline and coloring matter. According to our examination, it is really a mixture of such substances as are extracted from lobelia by alcohol, and having refused to dissolve in water are soluble in chloroform. It will be evident to the reader that this process certainly cannot separate the oils, wax and like bodies. That an organic acid is present is also probable.

Fixed Oil of Lobelia.—Lobelia seed contains thirty per cent. of non-volatile oily matters. The true fixed oil of lobelia is bland and non-acrid. As usually obtained, even by expression, it is acrid from contaminations. Menstruums that dissolve the oil also dissolve the chlorophyll, hence it has a green color as extracted from powdered seed. Pure fixed oil of lobelia has never been used in medicine and would be of little value.

An impure oil is a favorite with Eclectic physicians, who use it alone and associated with other substances. It is a constituent of Compound Stillingia liniment,** an excellent remedy, which in our opinion depends mainly upon this impure oil, which is simply a syrupy extract of lobelia seed, made with stronger alcohol acidulated with acetic acid.

Other Constituents of Lobelia.—There is a characteristic brown resin, coloring matters, and the usual constituents of plants. If the resin in alcoholic solution be precipitated by water even in presence of acid water, it carries with it a large amount of lobeline. This we thought to be a distinct alkaloid, but became assured after purification, that it was simply lobeline.††

COMMERCIAL HISTORY OF LOBELIA.‡‡—Since the day of Thomson, lobelia herb has been an important American drug. Growing abundantly in the Eastern States the first supply came from that section, but collectors in other parts subsequently gave it attention, and in domestic use and otherwise it is now a

*Elements of Materia Medica, vol. ii., 1846, p. 385, (and preceding edition.)

†American Journal of Pharmacy, 1842, p. 4.

‡Phar. Journ. and Trans., 1851, p. 270.

§The herb for these experiments was gathered to order and selected plant by plant. There was no foreign substance present and the lobelia was prime.

¶The neck of the retort was plugged near the retort with a strainer of linen to retain the spray. The neck was inclined to throw the condensed liquid back into the retort. Thus only the vapor passed to the condenser. In the large still with the herb, the exit for vapor extended upward 25 feet to the condenser and a spray could not pass over.

¶Pharmacographia, p. 400.

**See unofficial pharmaceutical preparations of lobelia, to follow.

††Many resins have strong affinities for alkaloids and other constituents of plants. They act somewhat like animal charcoal, carrying them from solution and holding them tenaciously.

‡‡This article should properly follow our description of the drug, p. 67.

drug collected over most of the country in which it abounds. The mountainous part of North Carolina furnishes large amounts.

During its early record when Thomsonism made unexpected demands, and collectors were few, the drug occasionally became scarce, or entirely out of market. Thomson was accustomed to warn his followers of this fact and advise them to secure a supply of "No. 1,"* the first opportunity. He states that in 1807 an offer of one thousand dollars per pound would have failed to procure the drug, and that at another season, two dollars an ounce could not purchase it.† However, at present, it is plentiful and the steady demand is easily supplied.‡

Lobelia seed, however, often becomes exhausted and occasionally out of market. After an unusually dry season it is scarce. Two years ago it could not be collected. This year (1886) the market is glutted. The demand is small, and, few dealers care to procure more than is necessary for use in one year. Besides, the general drug trade consumes but little, the demand being almost exclusively from a limited number of specialists, who as a rule obtain their stocks from the collectors and do not depend upon the dealer in drugs.

The "Herbalists,"§ of England, now regard lobelia with much favor, as is evidenced by their action in consequence of an endeavor, recently made by the Law and Parliament Committee of the Pharmaceutical Society, to have lobelia placed on the "English Poison Schedule."|| They state that they use the herb freely, probably some hundreds of pounds yearly.

PHARMACOPŒIAL HISTORY.—The Pharmacopœia of the Massachusetts Medical Society, 1808, under the name *lobelia*, recognized "the root" of *Lobelia syphilitica*. The first edition of the U. S. Pharmacopœia, 1820, as *lobelia* introduced "the herb" of *Lobelia inflata*, using as a synonym the common name Indian tobacco. This was accepted by the New York, (1830,) and the Philadelphia, (1830) editions. In 1840 the term Indian tobacco was dropped and has not since been recorded, although lobelia has been officinal in each successive revision.

The fact that the Massachusetts Pharmacopœia recognized *the root* of *Lobelia syphilitica*, doubtless aided in perpetuating the mistake of so many medical writers who have stated that the root and top of *Lobelia inflata* is employed in medicine.

Every revision of the U. S. Pharmacopœia has recognized the herb of *Lobelia inflata* as "lobelia" and in no instance has *Lobelia syphilitica* been accepted or the root of any species of *Lobelia* recognized.

*See note † page 85.

†Thomson's Guide and Narrative.

‡Thomson asserts that an abundant crop one season is followed by failure the next. We have also observed this, but, we find that it is often scarce for a series of seasons, owing to climatic influence probably, and occasionally is unusually plentiful.

§In the "Year Book and Transactions of the Society of United Medical Herbalists of Great Britain," 1885, we find xix members recorded.

||English Poison Schedule, see note § p. 88.

PHARMACOPŒIAL PREPARATIONS.—The first (1820) edition of the U. S. Pharmacopœia gave a process for making tincture of lobelia, two ounces of the herb to sixteen fluid ounces of diluted alcohol. This proportion was continued through each succeeding revision to 1880, at which time the strength was made two parts of lobelia to ten parts of tincture.

Acetum Lobeliæ, introduced in 1860, was made two parts of lobelia to diluted acetic acid, enough to produce sixteen fluid ounces, and in 1880 it was changed, one part of lobelia producing ten parts of the finished vinegar.

It will be observed that the strength of the tincture was increased about one-half in 1880, while the strength of the vinegar was decreased nearly forty per cent. We think that they should have been made identical in strength.

In 1880 the fluid extract of lobelia herb was introduced, diluted alcohol being employed in making it after the usual process for fluid extracts.

UNOFFICIAL PHARMACEUTICAL PREPARATIONS.—Scattered throughout medical and pharmaceutical literature we find many formulas for lobelia preparations. These preparations are still in more or less demand, and occasionally in considerable local use. We reproduce them with as little alteration as possible. The uses and doses are as we find them recorded, and in many cases would be considered inordinate at present.

Cataplasma (Poultice) of Lobelia.—Powdered lobelia herb, two ounces; powdered slippery elm, one ounce. Wet with whiskey; apply to rheumatic part.—(Sick Man's Guide, Lukens, p. 115.) This original compound was evidently followed by Prof. King in the following:

Cataplasma of Lobelia.—To equal parts by weight of powdered lobelia and elm bark add a sufficient quantity of weak lye to form a cataplasm. Used for painful swellings, inflammation of the breast, stings of insects, etc.—Am. Disp.

Enema of Lobelia.—Take of compound tincture of lobelia and capsicum, half a fluid drachm; water, half a fluid ounce; mix them together. A relaxant and antispasmodic clyster. Used in convulsions of infants.—Am. Disp.

Aqueous Extract of Lobelia inflata.—Lobelia seed, powdered, eight ounces; diluted alcohol, four pints; acetic acid, one ounce. Mix the acid and diluted alcohol and percolate the lobelia seed. Then evaporate to a soft extract.—(Prof. W. Procter,) American Journal of Pharmacy, 1842, p. 108.

Fluid Extract of Lobelia, Compound.—Blood root, skunk cabbage root, lobelia herb, of each four ounces. Make a fluid extract in the usual manner. An emetic, expectorant and antispasmodic. Used as a substitute for acetated tincture of blood root. Dose, from 10 to 60 minims.—Am. Disp.

Lotion of Lobelia, Compound.—Bayberry bark, lobelia herb, yellow dock, of each two drachms; vinegar, one pint; macerate for seven days and filter. Used for local applications in cutaneous diseases, such as erysipelas, inflammation, etc.—Am. Disp.

Liniment of Lobelia.—Stew the seeds of Lobelia inflata in animal oil. This is used to relax rigid muscles and contracted limbs by rubbing it in the skin.—Western Medical Reformer, 1837, p. 206.

Liniment of Stillingia, Compound.—Oil of stillingia, one fluid ounce; Oil of cajuput, half a fluid ounce; Oil of lobelia, two fluid drachms; alcohol, two fluid ounces; mix them together. Used in chronic asthma, croup, spasmodic diseases of the throat and lungs. Apply to the parts affected and take a few drops internally on a lump of sugar.—(Am. Disp.) The Lobelia we think is the chief constituent.—L.

Lobelia Seed with Sugar.—Powdered lobelia seed, powdered white sugar, of each four parts; rub well together and add one part of nerve powder; two parts of capsicum, and add the mixture to thirty-two parts of number six.—Thomsonian, Materia Medica, 1841, p. 699.

Syrup of Lobelia.—Vinegar of Lobelia, six fluid ounces; sugar, twelve troy ounces. Dissolve by heat, skim, add a little acetic acid, and strain.—Prof. W. Procter, American Journal of Pharmacy, 1842, p. 109.

Oxymel of Lobelia.—Add one part of strained honey to two parts of sour tincture; heat to boiling point, skim and bottle.—Kost's Domestic Medicine, p. 309.

Syrup of Lobelia, Compound.—Lobelia, four parts; blood root, two parts; macerate in thirty-two parts of vinegar for one week; strain with pressure. Pleurisy root, four parts; solomon's seal, two parts; cover with boiling water and keep hot one day, adding water to produce thirty-two parts of infusion. Mix the two liquids, bring to a boil and add forty-eight parts of sugar. Relieves cough; efficient in croup; used in all cases where it is desirable to increase secretion from the air passages. An excellent diaphoretic, used in all cases of cold.—Domestic Medicine, (Scudder,) p. 230.

Syrup, Well's Vegetable.—Onions, sixteen parts; Spikenard, eight parts; Horehound, four parts; Lobelia, two parts; Pleurisy, two parts; Skunk Cabbage, two parts; Water, forty parts. Mix, boil, strain; evaporate to eight parts. Add thirty-two parts of honey; sixteen parts vinegar, and sixteen parts gin. Dose, one tablespoonful.—Improved System Botanic Medicine, 1832, p. 386.

Pills of Aloes and Lobelia, Compound.—Extract of boneset, mandrake, ginseng, of each two drachms; aloes, eight drachms; gamboge, castile soap, of each four drachms; capsicum and lobelia seed, of each one drachm; oil of cloves, two minims; make into a pill mass, and divide into four grain pills. Cathartic. Useful in dyspepsia, constipation, jaundice, etc. Dose, from two to four.—Am. Disp.

Pills, Emetic.—Extract of peach leaves, poplar or butternut bark, one ounce; capsicum, one teaspoonful; powdered lobelia seed, half an ounce; nerve powder, two teaspoonful, and a few drops of oil of peppermint. Mix and make into pills.—(Thomsonian, *Materia Medica*, 1841, p. 699.) (Very indefinite.—L.)

Pills of Lobelia.—Lobelia seeds, capsicum, and scullcap, each, equal amounts. Make two grain pills. Dose, one to two, every two hours. Three to five at bed time, with composition tea. Uses: coughs, hoarseness, croup, asthma, etc.—Botanic Physician, (Elisha Smith).

Powder, Expectorant.—Powdered skunk cabbage root, four ounces; powdered unicorn root, two ounces; powdered lobelia seeds, one-half ounce; mix. Dose, half to a teaspoonful.—Improved System Botanic Medicine, 1832, p. 385.

Powder of Lobelia, Compound.—Lobelia, six drachms; blood root, and skunk cabbage, of each, three drachms; ipecac, four drachms; capsicum in powder, one drachm; mix them together. Used in all cases where an emetic is indicated. It vomits easily and promptly without causing cramps or excessive prostration. Dose, half a drachm every fifteen minutes in an infusion of boneset, until two drachms have been taken, or the patient vomits.—Am. Disp.

Third Preparation.—One ounce of powdered lobelia seed; one ounce of capsicum; one tablespoonful of nerve powder; mix; add to half a pint of Number Six, (No. 6). This is Thomson's great remedy, known also as Rheumatism drops and Hot drops.

Antispasmodic Tincture.—Tincture lobelia, tincture capsicum, of each, sixteen fluidounces; tincture nervinae, twelve fluid ounces. Dose, from half a teaspoonful to a tablespoonful. Used as an antispasmodic, and in large doses as an emetic.—(Improved System of Botanic Medicine, Howard, 1832, p. 379.) This is the original formula from which Prof. King devised:

Tincture of Lobelia and Capsicum, Compound. (King's Expectorant.)—Lobelia, capsicum and skunk cabbage, of each, two ounces; diluted alcohol, a sufficient quantity to make two pints of tincture by percolation. This tincture is a powerful antispasmodic and relaxant. Used in cramps, spasms, convulsions, tetanus, etc. Dose, half a teaspoonful as the case may require.—Am. Disp.

Tincture Lobelia herb.—Bruise fresh lobelia, press firmly into a jar, cover with alcohol, after a few days strain and press. To each quart add one ounce of essence of sassafras. Used as an emetic, and for external application to wounds, bruises, inflammations, ulcers, eruptions, etc. Dose, one to ten teaspoonfuls.—(Improved System Botanic Medicine, 1832, p. 384.) The original tincture of lobelia. Dose, now heroic.

Tincture Lobelia seeds.—Digest four and one-half ounces of powdered lobelia seed in a pint of alcohol.—Improved System Botanic Medicine, Howard, 1832, p. 379.

Tincture of Lobelia, Compound. (King's Expectorant.)—Lobelia, blood root, skunk cabbage, wild ginger and pleurisy root, each in moderately fine powder one part; water, sixteen parts; alcohol, forty-eight parts; make a tincture in the usual manner. An excellent remedy for children and infants. Used as an expectorant, as a nauseant in coughs, asthma and where expectorants are indicated.—Am. Disp.

Tincture of Lobelia, Ethereal.—Lobelia herb, five ounces; spirits of sulphuric ether, two pints. Make a tincture by percolation.—Edinburgh Dispensatory, 1848.

Tincture of Lobelia and Hydrastis.—Hydrastis, lobelia seed, of each, two parts; diluted alcohol, sixteen parts. Make a tincture by percolation. A valuable local application.—Am. Disp.

Tincture of Sanguinaria, Compound.—Blood root, lobelia, skunk cabbage, of each, two parts; distilled vinegar, thirty-two parts; alcohol, two parts. Make two pints of tincture by percolation. Used as an emetic and expectorant. Dose, twenty to sixty drops.—Am. Disp.

Tincture of Viburnum Opulus, Compound.—Lobelia seed, skunk cabbage, stramonium seed, capsicum, blood root, of each, one part; diluted alcohol, one hundred and twenty-eight parts. Make a tincture by percolation. Stimulant and antispasmodic. Used in asthma, hysterics and nervous diseases. Dose, twenty to sixty drops.—Am. Disp.

Well's Cough Drops.—Tincture lobelia, one ounce; anodyne drops, two ounces; antispasmodic tincture, one ounce. Dose, half to a teaspoonful.—Improved System Botanic Medicine, 1832, p. 382.

Sour (Acid) Tincture of Lobelia.—Made the same as the ordinary tincture, vinegar being used instead of the alcoholic menstruum.—(Kost's Domestic Medicine, p. 399.) This is the original of the official Vinegar of Lobelia.

MEDICAL HISTORY.—Several annoying features in connection with the history of this plant are considered by us, and an endeavor is made to study them in chronological order.

The first printed record of the emetic properties is by Rev. Manasseh Cutler,* who named it emetic weed.

*Account of Indigenous Vegetables.—Am. Acad. Sciences, 1785, p. 484.

Manasseh Cutler, LL.D., was born in Killingly, Conn., May 3, 1742. First he engaged in the whaling business, then in merchandise in Edgertown; studied law and was admitted to the bar in 1767; removed to Dedham, studied theology, was licensed in 1770 and ordained minister of Hamilton, September, 1771. He became chaplain of Col. Francis' regiment, September, 1776, fought in the action in Rhode Island, and for his bravery received a present of a

Schoepf, 1787,* next incorrectly ascribed astringent properties to *Lobelia inflata* and stated that it was used in ophthalmia. He had confused the two species and affixed the properties of *Lobelia inflata* to *Lobelia syphilitica*.

Then came Samuel Thomson,† who introduced the plant into medicine

fine horse. He also studied medicine and other branches of science. He became a member of the American Academy in 1781, contributing a series of scientific papers to its memoirs in 1785; his botanical paper being the first attempt at a scientific description of the plants of New England. In this paper we have the reference to the emetic properties of lobelia, which is the first printed notice of the nature of the plant, but he did not use it in medicine.

With Dr. Beck he prepared the chapter on trees in Belknap's history of New Hampshire; became a member of the Philosophical Society of Philadelphia, 1784; as agent for the Ohio Company he purchased 1,500,000 acres of land, northwest of the Ohio river, 1787, and started the first emigrants to that section, who settled at Marietta, Ohio, April 7, 1788. He accompanied them in a sulky, returning to New England in 1790. Gen. Washington appointed him Judge of the Supreme Court of Ohio Territory, 1795, which honor he declined. He was member of Congress from 1800 to 1804.

In the prosecution of Samuel Thomson, 1809, Cutler was called as an expert to identify the remedies Thomson used. It was about this time that he (Cutler) became interested in the use of lobelia as a remedy for asthma, (see Thacher's Dispensatory, 1810,) and there is reason to believe that his attention was drawn to it by Thomson and his followers, as before this Thomson had used the herb in that disease and his followers were numerous throughout all of New England. Cutler died in Hamilton, Mass., July 28, 1823.

*Materia Medica Americana, 1787, p. 128.

†Samuel Thomson was born in the town of Alstead, State of New Hampshire, February 9, 1769. His early life was spent in hard labor upon a farm, and his education was limited. He commenced medical experiments when about ten years of age by vomiting his playmates with lobelia, and afterward became as is known, the champion of this herb. He married Susanna Allen, of Surrey, New Hampshire, July 7, 1790. His medical investigations commenced in the treatment of his own family, and then he began to gather roots, herbs and barks and to practice empirically in the families of his neighbors. That he also studied the medical literature of his day is evident from his publications, although he delighted in believing himself entirely independent, and was very caustic and aggressive towards the Regular Medical Profession.

In due course of time, Thomson became known outside his immediate neighborhood. Thus, in 1805, he made a professional trip to Richmond, in 1806 was called to New York City to use his "treatment" on Yellow Fever, and in 1807 to Vermont. After this he traveled considerably over the New England States, and eventually through the West in the practice of his peculiar theory.

During these trips his combative nature led him continually into heated arrangements of members of the Regular Medical Profession, who bitterly denounced his treatment, resulting finally in an open charge of murder against him in 1808, for "sweating (see note *, p. 85) two children to death," and again, in 1809 for killing a certain Captain Trickey, who Thomson declared that he had not treated at all. Finally, in 1809, a Dr. French, between whom and Thomson there had long existed an intense animosity, preferred charges, and Thomson was arrested for the wilful murder of a young man named Lovel, who had died under his attention. Dr. French charged that he "did kill and murder the said Lovel with lobelia, a deadly poison."

Thomson was thrown into prison at Newburyport, Massachusetts, November 10, 1809, where he remained suffering the severe cold of that country without fire or comfort until December 10th, when he was taken to Salem, Mass., for trial, his friends having succeeded in inducing Judge Theophilus Parsons to hold a special session of the court. However, owing to sickness of the Judge, his trial did not occur until December 20th. The prosecution seemed to base their charges on the fact that the powder given Lovel was lobelia, a Dr. Howe testifying to that effect. The defense showed, however, that Howe was not acquainted with lobelia, and also that the powder Drs. Howe and French thought to be lobelia was marsh rosemary root. (Thomson asserts that this was what he administered). Finally the court acquitted Thomson, without, as he claims, an examination of his witnesses. However, Tyng's Reports, vol. vi., states that on the claim of ignorance only did the Judge instruct the jury to acquit Thomson, and our view of the treatment as shown by the report is to the effect that both lobelia and the marsh rosemary were administered.

This was the memorable "Trial of Thomson," but it did not end the assaults of his adversaries. Thomson entered suit for damages against Dr. French, March, 1810, and failed in his prosecution, losing much time and more than six hundred dollars of costs.

In 1811 a doctor in Eastport, Me., while Thomson was passing his office door, tried to kill him with a scythe, and it seems that even Thomson now became discouraged, for he writes: "I found I had enemies on every hand, and was in danger of falling by some of them. Everything seemed to conspire against me."

In March, 1813, he obtained a *patent* to protect on his system of medicine, known thereafter as "Thomson's Patent."

We find that although Thomson was very bitter regarding the Regular Profession generally, he spoke in the highest terms of Drs. Rush and W. P. C. Barton, of Philadelphia, with whom he had several interviews.

Dr. Thomson died in Boston, Mass., 1843, after a tedious application of his own medicine, known as Thomson's Course, (see note † p. 85).

We have consumed considerable space in recording the principal points in the life of an exceedingly, energetic

about 1793 under a peculiar system of practice or theory,* in which he used classes† of crude drugs in a system of courses,‡ lobelia being the first class and

and zealous man, who boasted of his illiteracy, never attended a college, or received a lecture in medicine, but who created a lasting excitement in the medical world of America, and who still has many earnest followers under the name Thomsonians, although his methods of treatment are very much modified.

His life was marred by sufferings and quarrels. He was in a constant turmoil and fearlessly attacked his opponents, however high their positions. Defeat did not dishearten him, success nerved him to greater aggressments. Enemies arose within his camp towards his latter days and he met them as fearlessly as he did the "Regulars." We cannot, but admire the tenacity with which he adhered to his views and practice. If he had been permitted to receive a thorough education, and had been led to systematize his labors, his indomitable spirit and tenacity of purpose would have doubtless made him conspicuous among the pioneers of America, either within the medical profession or otherwise. It will yet be our duty to review Thomson's Theory in the practice of which it was claimed (1834) that thirty thousand persons were enrolled. They were then generally known as "Lobelia Doctors" "Heaters," "Steamers," and "Sweaters."

*Samuel Thomson believed, "that all diseases are the effect of one general cause and may be removed by one general remedy, is the foundation upon which I have erected my fabric." This is a positive statement, showing the views he held of the various disease expressions. The reader must not however, infer (as antagonists to Thomson misstated) that by the term "one general medicine" he meant a single drug. Upon the contrary, he used many drugs and he states, "all diseases might be cured by one general remedy or principle, applied in a great many forms as medicine."

Origin of Disease.—"I found that all diseases to which the human family were subject, were, however various the symptoms and different the names by which they were called, produced directly from obstructed perspiration."

Cause of Obstructed Perspiration.—"If there is a natural heat, there must be a natural perspiration." Obstructed perspiration "is always produced by cold or the absence of a suitable degree of natural vitality."

Heat is Life.—Arguing from the foregoing, Thomson announced the axiom that has since become attached to his followers: "Heat is life and cold is death." He did not perhaps mean this in a literal sense, but, he believed that a low temperature (cold) caused disease, and that fever a friend was an effect of cold. "The cold causes an obstruction and fever arises to remove it." This view is not peculiar. Perhaps, the religious of the Sun worshippers may be considered about the same. "Coffinism" of England was similar.

Canker.—In all Thomsonian works the name is conspicuous. Dr. Thomson believed that a "white feverish coat" was caused by cold and attached itself to the mucous membranes of the stomach and bowels. This he called canker. "Canker and putrefaction are caused by cold. If this growth of canker is not checked and removed, it will communicate with the blood, when death will end the contest between heat and cold." Dysentery is caused by canker in the bowels. The piles is canker below the reach of medicine in the usual way. What is called bearing down pains in women is from the same cause.

Object of Medication.—According to Thomson should be to produce a great internal and external heat to prevent the formation of canker and throw it to the stomach, and then to remove it from the stomach by emetics. Astringent in Thomson's opinion, combined with this secretion (bayberry and other like bodies); stimulants promote perspiration (capsicum, steam, etc.); emetics remove the canker from the stomach.

‡Thomson arranged his remedies into *classes* and numbered them, often individualizing a drug by making it the conspicuous member of a class. Thus, Emetics made Class No. 1, and lobelia being his great emetic was simply called "No. 1." He would say, "then administer No. 1."

The classes were as follows:—Class No. 1, "Emetics, to cleanse the stomach, remove obstructions and promote perspiration," lobelia being typical.—Class No. 2, "Stimulants, to raise and retain the vital heat of the body, and promote free perspiration," capsicum being typical.—Class No. 3, "Astringents, to scour the stomach and bowels and remove the canker," bayberry and composition being typical.—Class No. 4, "Bitters, to restore digestion, and correct the morbid secretions of the blood and bile," hydrastis, populus, etc., being typical.—Class No. 5, "Restorative Tonic, compounded to correct digestion, and strengthen the stomach and bowels," wild cherry being typical.—Class No. 6, "Antiseptics, to give tone to the stomach and bowels, and prevent mortification," myrrh and a compound tincture of myrrh being his favorite. The familiar No. 6 of the present day, is modified from Thomson's formula.

The enemies of Thomson have asserted that he first administered No. 1, if that failed, used No. 2, and so on until through with the list if the patient still lived.

‡The following condensed accounts of the system of Thomson's Courses is taken from the American Vegetable Practice, by Mattson. In Thomson's works the directions are not so explicit as herein given, as it seems that he depended to an extent upon the personal instruction of himself or his agents.

Thomson's Course of Medicines.—1st. Give the patient a teacupful of hot bayberry tea, (No. 3,) then an injection of a cup and a half of an infusion of bayberry and a teaspoonful of lobelia. Sometimes the lobelia of this injecting fluid is increased and a teaspoonful of capsicum added.

2nd. When the injection has operated, a steam bath is to be applied to the patient and a *second* teacupful of bayberry tea. If he does not perspire freely, in ten minutes, give a *third* teacupful of tea, and add to this last a teaspoonful of capsicum. In about twenty minutes, remove the patient from the bath, and, into a warm bed (sometimes a cup of ice water was dashed over the person upon removal of sweat bath) with a hot stone to his feet.

his principal remedy. He met the opposition of most Regular physicians, who bitterly decried the indiscriminate use he made of drugs, and he eventually was arrested (1809) and tried for killing a patient with lobelia. This trial brought lobelia before the public, and from that time to the present, lobelia has been in more or less demand and has come into use by all schools of medicine. Accounts of its uses and accepted medical properties in the different schools have been written for this work by authorities of these schools.

In studying the history of the introduction of lobelia into medicine the following questions have at various times arisen and attracted more or less attention and discussion by our medical writers.

1st. *Did the North American Indians use Lobelia inflata?*—In our next article on *Lobelia syphilitica* it will be seen that Sir William Johnson, preceding 1800, bought a cure for syphilis from the Indians, which turned out to be the root of *Lobelia syphilitica*. It is asserted in most medical works that the American Indians used *Lobelia inflata*, but this assertion is not supported by the testimony of any writer we can find who was acquainted with the medicines employed by the Indians, and the pioneer travelers of America (Shoepf excepted, see p. 84,) failed to refer to the plant. We, therefore, conclude that these writers have confused the *Lobelia syphilitica* of Johnson with *Lobelia inflata*.

Carver, who spent many years of his life among the Indians, and described the plants, trees and medicines of the tribes among whom he traveled, does not mention it.

Lewis and Clark speak of the use of the vapor bath, but do not mention that *Lobelia inflata* was used by the Indians of the Upper Missouri. Speaking of syphilis among the Indians they say:* "When once a patient is seized, the disorder ends with his life only." They state of the Chippewa Indians, (p. 136,) that, "their specifics are the root of the lobelia and that of a species of sumach." It is evident that this is not from observation, as the Chippewas, (also known as the Ojibwas,) were not the Western Indians. They embraced many formidable tribes about the great lakes. Into their country Sir William Johnson extended his treaties, and his statement regarding *Lobelia syphilitica*, is evidently the source of the statements by Lewis and Clark.

The book of the Indians, 1837,† gives no instance of its use by the Indians, or of any other emetic.

The paper on "Indian Medicine,"‡ by Browne, does not refer to any substance that can be identical with lobelia.

Major Long, 1819, in his account of the medicines and practice of the Indians of the West, evidently knew nothing of *Lobelia inflata*.

Professor Nuttall informed Dr. Mattson that in his excursions among the Indians he had never known them to use *Lobelia inflata*.

3rd. Add a heaping teaspoonful of powdered lobelia herb to a cupful of the capsicum and bayberry tea, give at one dose, or, infuse five teaspoonfuls of lobelia in a cup and a half of hot water and take in three doses even if each dose vomits.

4th. After the vomiting ceases, a second steaming is administered, giving the patient a cup of hot ginger or composition tea while in the bath. Then if the patient "has sufficient strength" he may dress, and if not he must be put into a warm bed. This concludes the "course."

5th. Bitters and tonics are then administered. If the malady is not cured the course must be repeated. "Miss B—, of Lynn, Mass., took twenty-seven courses for a malignant disease of the stomach." "I knew a gentleman with dropsy to whom a course was administered once a week for nine months," etc.

This severe method of treatment gave rise to the doggeral once applied to Thomsonians:—

"I puke, I purge, I sweat 'em,
And if they die, I let 'em."

*The Expedition to the Sources of the Missouri, Lewis & Clarke, vol. ii., pp. 135 and 136.

†Book of the Indians, Boston, S. G. Drake, 1837. A very interesting and unique publication.—L.

‡Indian Medicine, J. M. Browne, in Indian Miscellany, p. 74. (Edited by W. W. Beach, 1877).

The interesting narratives in "Indian Captivities," contain no record of *Lobelia inflata*, although rich in the experiences of persons, who passed many years among the Indian tribes east of the Mississippi.

Samuel Stearns, M.D., 1772, in his *American Herbal*, mentions other species of lobelia, but not *Lobelia inflata*, and he makes no reference to the Indians using an emetic. Dr. Stearns was a native of Massachusetts and traveled among the Indians of that State with intent to study their remedies, and would not have omitted this plant if it had come under his observation. Neither Schoepf, Barton, nor Rafinesque mentions *Lobelia inflata* as an Indian remedy from personal experience, and none of these authors would have neglected it, if aware of its being in use.

Catlin,* in his explicit descriptions of Indian customs omits it.

However, Mattson, 1841,† states that, "There is abundant traditionary evidence that it was used by the Penobscot Indians long before the time of Dr. Samuel Thomson, its reputed discoverer, but with the exception of that tribe, I have not been able to discover by any researches I have made, that the American aborigines had any knowledge of its properties or virtues."‡ Mattson, however, neglects to give any positive testimony, or refer to any authority.

Dr. G. A. Stockwell, in a very recent article§ omits it, and thus helps to confirm the fact that lobelia was not used by the Indians.

Therefore, from authorities quoted, and numbers of other works searched without avail, we conclude that the evidence is altogether against the reiterated assertion that *Lobelia inflata* is a drug handed down to us from the American Indians. We cannot find proof of a single instance where it was employed by them. If the Penobscot Indians used the plant, as Dr. Mattson believed, (from tradition) it is possible that the adjacent settlers learned of its properties from them, but we would more rationally accept that the early use of *Lobelia inflata* in domestic medicine was an accidental discovery of the whites. Those were days of heroic remedies; bleeding, emetics and blisters were the methods of treatment, and it is not to be presumed that so remarkable and common an emetic as lobelia could remain unknown. That Thomson and Cutler learned of its emetic properties by independent personal experience is undeniable we think, Thomson especially insisting that he stumbled upon it.

It is a common belief with some persons that the Indians used the lobelia in connection with their "Sweat Baths" to clear their minds, and remove their ailments, but our endeavors to find the authority for such statements have resulted in failure. The "Medicine Men," it is true, pretended sometimes to vomit bones, by which the future was foretold, but, this if not a deception had no connection with the medical uses of lobelia, and there is no evidence at our command to support the supposition that the whites learned of its properties from the Indians, or that the Indians used it in medicine.

2nd. *Did Samuel Thomson discover the Properties of Lobelia indepently of others?*—Thomson asserts that,|| sometime in early life (1773) I discovered a plant which had a singular branch and pods. The taste and operation produced were so remarkable that I never forgot it. I afterwards used to induce other boys to chew it, merely for sport to see them vomit. I tried this herb in this way for nearly twenty years without knowing anything of its medical virtues. This plant is what I have called the *emetic herb*.¶

*Manners, Customs and Condition of the North American Indians, Catlin, vol. i., p. 186.

†Mattson's *American Vegetable Practice*.

‡Thomson believed that the reference to the use of lobelia by the Indians was an intentional mistatement in order to rob him of the discovery, he writes:

"It is said by Thacher, that it was employed by the aborigines, and by those who deal in Indian remedies; and others, who are attempting to rob me of my discovery, affect to believe the same thing; but this is founded altogether upon conjecture, for they cannot produce a single instance of its having been employed as medicine, until I made use of it. The fact is, it was a new article, wholly unknown to the medical faculty, till I introduced it into use; and the best evidence of this is, that they are now ignorant of its powers, and all the knowledge they have of it has been obtained from my practice.—Thomson's "New Guide to Health," 1822, p. 52.

§Popular Science Monthly, "Indian Medicine," G. A. Stockwell, M.D., Sept., 1886, p. 649.

||New Guide to Health, p. 16.

¶Ibid, p. 27. We must not forget that this was written after the trial of Thomson, and then it seems, there was an intense feeling between Thomson and Cutler.

Thus it seems that Thomson understood the emetic nature of *Lobelia inflata* before 1793, but, he asserts that, "I tried this herb in this way for nearly twenty years without knowing anything of its medical virtues." He further admits this by saying, "It had never occurred to me that it was of any value in medicine until about this time (1793). I have since found by twenty year's experience in which time, I have made use of it in every disease I have met with, to great advantage, that it is a discovery of the greatest importance."

Thus Thomson admits that he knew nothing of the use of lobelia in medicine preceding 1793, and the first record we have of his making use of it in asthma is in 1807, to wit: "In the fall of 1807, I introduced lobelia, tinctured in spirit, as a remedy in asthma."

Mattson, 1841,* states however, that "it was used as a remedy by many people in New England, long before his (Thomson's) time." He recounts as follows:†

"Mr. Phillip Owen, now eighty years old, relates that when a boy he was sent into the field by his mother to collect some lobelia for a child, sick with the quinsy, and that the herb, administered in the usual manner, afforded speedy and entire relief." This would show a use of it at about 1770.

"Mr. William Coburn, who also reached his eightieth year, says that lobelia has been used as a medicine in the state of Maine, both by the people, and the Penobscot Indians, ever since he can remember, which is a period of not less than seventy years." This also carries us back to 1770.

Dr. John A. Hyde, of Freeport, Maine, a very old physician states that, the people in that vicinity were in the habit of using lobelia under the name colic weed, when he first settled in the town, which was about fifty years ago. He says they employed it in various complaints, but particularly in colic, and considered it perfectly safe and harmless." This carries the use back to 1790, and antedates Thomson again.

Dr. E. Harlow, of New Lebanon, Conn., writes under date of May 15, 1835, to a gentleman in Boston: "I commenced the vegetable or botanic practice of medicine about 1796, under the instruction of Dr. Root, of Canaan, Conn., who was esteemed as an able botanic physician. He made use of lobelia under the name Indian tobacco, and taught me the use of it; and from that period to the present, I have continued to employ it in my practice. I may also state that Dr. Forbes, of Lebanon, used it when I was a boy, and from that circumstance it received the name of "Forbes weed." And lastly, "Doctress Charity Shaw Long, of Albany, N. Y., secured a patent for the use of *Lobelia inflata*, in 1812, which was one year in advance of Thomson's patent."

Thus from evidence that is entitled to credence it seems that lobelia was somewhat known as a domestic medicine, when Thomson was one year old, and there is little doubt that its use in household practice long antedated any positive information that can be found in print at this late day. Nevertheless, Thomson introduced it to medicine, and none will dispute that Samuel Thomson made lobelia a familiar name to hundreds of thousands of Americans; that he made it notorious none can deny. Whether the domestic uses of lobelia (by a few persons) could have served to give Thomson a start with his "Practice" is a question of little moment. He distinctly asserts that such was not the case, and that he discovered and introduced lobelia independently of all others. In our opinion his statement is entitled to credence. He was intensely enthusiastic on the lobelia subject, and when writers on medicine ignored his claims, to give credit to Cutler and Drury, he considered it an act of injustice, and he expresses himself on the subject as follows: "They cannot produce a single instance of its having been employed as a medicine till I made use of it."

This tendency to neglect him, and, as he believed to persecute him for opinions sake, finally induced Thomson to seek Government protection, both for legal and monetary considerations, resulting in "Thomson's Patent."

Is Lobelia a Poison?—A recent endeavor has been made in England to place lobelia on the "Poison Schedule",‡ and in studying the record we find that in several instances legal steps have

*The American Vegetable Practice, Mattson, vol. i.

†Mattson and Thomson were at first friends, but afterward were enemies. It seems to us that Mattson makes it a point to show that Thomson was not first to use lobelia.

‡Thomson's Mat. Med. and Anat., 13th edition, p. 585.

§English Poison Schedule, (1868). This is an English law, designed to protect the public against intentional and accidental poisoning. Among the omissions are such energetic bodies as sulphuric, nitric and hydrochloric acids,

been taken to punish persons, who, it was claimed had destroyed life by the injudicious use of this drug. The trials of Dr. Thomson* and Dr. Frost† have attracted the most attention.

In reviewing the cases we find few convictions resulted, and, even then the sentences were light. It seems to us that the prosecution failed because as a rule the evidence did not show that lobelia was really a poison. The members of the Regular Medical Profession were usually the aggressors and seemed anxious to convict, but evidently had at that time but little personal acquaintance with the drug. Their statements in court were usually based upon the papers in Thacher's and Cox's Dispensatories, whereas, the Thomsonians would produce abundance of testimony to show that lobelia in immense doses, far beyond the amounts named as poisonous by the prosecution was continually taken without fatal effects. They would bring as witnesses those who had taken the drug, and they evidently impressed the court with the fact that the Thomsonians were more familiar with lobelia, than were the members of the Regular Medical Profession.

There was another factor in this case, that we cannot underestimate. The cry of oppression and persecutions was raised and the sympathies of many people enlisted in behalf of the Thomsonians from this stand. The Thomsonians of that day were not altogether uneducated as some now suppose. Upon the contrary, we find that many highly cultivated persons adopted their methods and bought the "right." Prof. Benj. Watterhouse, (Professor of Theory and Practice of Medicine in Harvard,) was zealous, also Prof. Tully, of Yale, and throughout New England Thomson numbered his followers by thousands, from among the best informed families. Thus it is, that Thomsonism did not meet the popular disfavor that it held with the Medical profession. To sum up we may be pardoned for observing,

We believe that lobelia is not an active poison, but that injudicious use might result fatally, as is true of other moderately energetic remedies. No doubt more fatal effects would result from its use if it were not so violently emetic that the effect of a poisonous dose of the drug is first to expel it from the stomach.

The physiological investigations of Prof. Roberts Bartholow following, show conclusively that the alkaloid lobeline is poisonous and will produce death in animals.

THE ACTIONS AND USES OF HYDROBROMATE OF LOBELINE.—(Written for this publication by Prof. Roberts Bartholow, M. D., LL. D., Professor of Materia Medica, General Therapeutics and Hygiene, in the Jefferson Medical College, of Philadelphia.)—*Preliminary.*—This research consists, for the most part, of my own experiments and observations. Facts obtained from other sources have been adopted when my own experiences were in harmony with them. The preparations used were furnished me by Prof. J. U. Lloyd, whose name is a

(the English Journals often give records of death by them). We presume that the commerce of that country would render it useless to attempt to control these substances. Ergot and oil of savin are listed, and it seems that to these should be added oil of cedar, oil of tansey, oil of pennyroyal, and perhaps gossypium bark, if the unborn are to be considered. Oxalic acid is named, but binoxalate of potassium (a common drug here) omitted. These and other features seem to us to indicate that the list should be revised, and certainly twenty years in our country would demand a revision.

In the recent excitement in England over a death after taking lobelia, many writers urged that lobelia be placed on the poison schedule. In our opinion, this could not be consistently accomplished without adding ipecac, turpeths mineral, and perhaps other like substances. Doubtless, English pharmacists generally agree that a careful revision of their poison schedule is desirable, but, we doubt if it will ever be possible to include all moderately energetic drugs that by abuse may produce death, as is perhaps true of lobelia. In our country lobelia is not considered to our knowledge in any list of poisons. Our hillsides are covered with the herb, its properties are well known, and it is never used as a poison by those inclined to produce death, but is freely employed as an emetic by country people.

*See note † p. 84.

†Dr. R. K. Frost, of New York City, was arrested and tried December 13, 1837, for killing Mr. T. G. French by putting "him into a vapor bath" and administering "poisonous concoctions of lobelia" and "giving deleterious herbs which no reasonable man would administer to a dog." This trial, next to that of Thomson, exhibited the intensity of feeling that existed at that time, and from over the entire country it attracted the attention of persons who were the least interested in medicine. It lasted ten days and the jury returned a verdict of "guilty of manslaughter in the fourth degree," and recommended the accused to the mercy of the court. He was sentenced to three months imprisonment. The history of this trial was issued in pamphlet form (104 pp.) and used by the Thomsonians over the country to show that they were persecuted.

sufficient guarantee of their genuineness. They consisted of one per cent., and one-tenth per cent. solutions of the hydrobromate of lobeline. The investigation includes the physiological and clinical actions of this remedy.

General Result of the Action in Cold and Warm-blooded Animals.—Given in sufficient quantity, an increasing failure of muscular power, staggering and incoordination, retching and salivation, are observed in from five to fifteen or twenty minutes after it is administered. First occurring in the hind extremities the evidences of muscular paresis, then extend to the fore members. The frog becomes less and less able to jump and to turn over from a position on the back, and the rabbit yields in the hind legs, reels, and at length can no longer control these members, and the forearms and arms soon after are disabled in the same manner; sensibility and the brain functions remain unimpaired. Before the paralysis has become complete, if the amount given has not been too large, the receptivity and response to peripheral impressions is for a short period somewhat more ready, and this is, more especially true of frogs. The respiratory function is embarrassed in proportion to the general paralyzing action. After a period of rather slower respiration it becomes quicker and increasingly shallow and laborious. With the lessening supply of oxygen, carbonic acid narcosis comes on, and death ensues with complete muscular resolution and without convulsions in frogs, and usually with clonic convulsions in rabbits the failure of respiration being the immediate cause.

Action on Nerve and Muscle.—When the sciatic nerve is isolated, the limb ligatured, and a merely paralyzing dose is administered, the nerve when excited by a faradic current at the earliest period of the action responds feebly, for the muscles of the limb below the ligature contract but slightly. When the paralysis is complete at length the strongest excitation of the nerve causes no response in any degree of muscular contraction. When this occurs the muscles are found to be readily excitable on direct electrical stimulation. It follows hence that lobeline destroys the excitability of the motor nerve endings, and does not impair the contractility of muscle.

There is a stage in the action of small doses, however, when the irritability of motor nerve and muscle is actually heightened: when the paralyzing effect is just beginning to manifest itself after the administration of one minim of the one per cent. solution, a slight tap on the skin of the back causes an immediate response in general muscular movement of a tetanic character. From this it must be concluded that when the first impression of lobeline is making, the nervous tissue is irritated by the medicament, but as the action continues and increases, the irritation is succeeded by loss of function. Furthermore, when the effect of lobeline in small quantity is such as to cause general muscular contractions on irritation of the skin (heightened cutaneous reflex) it is obvious that the physiological effect is not limited to the motor-nerve endings, but includes the spinal cord as well. It may be suggested, that the paralyzers, whose action is first felt by the intra-muscular nerve elements really act through the spinal

cord and not as is now supposed on the nerve endings only at the beginning.

Sensibility remains unimpaired, certainly, up to the period of the cessation of all muscular contractility, for the corneal and other reflexes are preserved until then. When the action of lobeline has attained its maximum, the paralysis is complete, and there is no response to any form of irritation.

Effects on the Circulation and Respiration.—When the fullest effect of lobeline is attained in the frog, if the chest be opened the heart will be found still in action at about 28 per minute, but the contractions are not energetic, although rhythmical. If the medulla be previously divided, the heart will be found at a standstill, its cavities distended. If in action, electrical stimulation increases it; if at rest, a strong faradic current will start the auricle in active movement, and the ventricle in feeble and irregular contractions chiefly of the basic portion.

The most important of the effects of lobeline on the heart, is its action on the vagus. At first, and with a small dose, the vagus is briefly stimulated, then depressed in function, but, it is completely paralyzed at the period of maximum effect, and no strength of current will then stop the heart. With a minute dose, the effect first produced is irritation of the vagus, with slowing of the heart, but as the effect deepens, the heart grows more rapid with lessening of the inhibition. It is probable that every first dose given, causes some slowing of the heart's movements, but this effect is so transient and slight that it escapes detection. With the decline in the inhibition there ensues increased action of the heart and lowering of the vascular tension. The body temperature rises somewhat *pari passu* with the increased rapidity of the circulation. As the respiratory muscles fail in power, the breathing becomes more and more labored, panting and shallow. The oxygenation of the blood is progressively diminished carbonic acid accumulates, the lips are cyanosed, and stupor is succeeded ultimately by coma. Up to this point the mental processes are not disordered, and the sensibility remains unimpaired.

Therapeutical Applications of Lobeline.—To avoid all subjects of controversy, I confine my observations to facts personally ascertained, and give the results of my own therapeutical uses of this remedy:

Having ascertained that lobeline possesses the power to lessen the reflex action of the spinal centres, I have administered it in those maladies characterized by irritability or exaltation of this function. In *epilepsy* it appears to be a most promising remedy if right conditions exist. It is the less useful, the more decidedly the convulsive seizures approach the epileptiform character; and it is more effective, the nearer the cases are to the true or essential type. The bromides may be quite successful in arresting convulsions due to coarse lesions of the brain, although not acting on the structural changes in any way. Now lobeline does not act favorably in such conditions.

In nocturnal epilepsy, which, as is now well known, does not usually yield

to the bromides, and in the cases not arising from an obvious peripheral irritation or accompanied by a defined aura, in the pale-anæmic and lymphathic type of subject, the best results obtainable from this remedy may be expected. As, however, definite conclusions can be formed only after sufficient length of observations the real value of the hydrobromate of lobeline must be ascertained by comparative trials through several years. Now, it can be asserted merely that this remedy promises well.

More definite results can be given from the administration of lobeline in certain neuroses of the respiratory organs, as *asthma*, *whooping-cough*, *pseudo-angina pectoris*, in the *spasmodic cough* of emphysema, the *cough* of habit, renal and other *reflex asthmas*. Somewhat more specific statements can be made as respects its utility in all these cases.

In that form of asthma, which is merely a functional disorder, the best results may be expected from it. The dose at the outset should be about 1-60 grain, and this can be repeated in a half hour when the attack is acute and severe, and afterwards *pro re nata*. When the attacks are recurring and persistent, the lobeline should be given three times a day from 1-60th to 1-30th grain, in persons having the ordinary susceptibility to its action, and 1-20th grain in those with less. When desirable or circumstances require, it may be combined with morphine, or cocaine, or both. The asthmatic seizures which attend emphysema are often quite promptly relieved by it. When in the course of chronic bronchitis, the mucous membrane furnishes but little secretion and the cough is dry and harrassing, lobeline acts very efficiently. It has also appeared to do great good in cases of pseudo-angina pectoris, with weak action of the heart and embarrassed respiration. By lowering the vascular tension and lessening the work of the heart by relaxing the inhibition, the pulmonary circulation is carried on with greater ease, and hence the distress of breathing subsides. There is here, as I conceive, a most important sphere of usefulness—for this morbid complexus is by no means uncommon, and we have not many agents capable of affording the direct relief given by lobeline.

THE HOMŒOPATHIC USES OF LOBELIA INFLATA.—(Written for this publication by Prof. Edwin M. Hale, M. D., Emeritus Professor Materia Medica and Therapeutics in the Chicago Homœopathic College).—I consider that the sphere of action of this species lies midway between tobacco and veratrum album, or their active principles, nicotine and veratrine. It acts upon the motor-nervous system and upon the respiratory centre in the medulla.

The nauseous effects of this drug are far more intense than tobacco, and this is the principal reason why it is not used for the same purpose as tobacco. Another reason is that the system does not tolerate the drug, as it does tobacco. I have, however, seen habitues of lobelia, who, from taking it for asthma and dyspepsia, came to tolerate it to a degree which seemed surprising.

Lobelia inflata was first introduced into our school in this country at the same time and in the same manner as the Lobelia syphilitica, (1838). In 1841 it was in-

roduced into homœopathic practice in Europe by Dr. A. Arac, of Leipsic, in the 15th volume of "Hygiea." Since that time it has been used to a considerable extent in our practice, but although a powerful drug, its curative sphere is limited.

We find it useful principally in asthmatic affections. It is useful in two varieties, namely, the nervous, which arises from paresis of the respiratory centre, and the catarrhal or "humid asthma." In the first, it is strictly homœopathic, and has been found curative in very minute doses. In the latter, when the mucus rales are loud, and the sense of suffocation is due to a mechanical obstruction by the mucus, and the coincident spasm of the bronchi, larger doses must be used, for this condition is similar to the secondary effects of the drug. I have seen almost magical relief follow doses of $\mathfrak{z}\text{i}$ repeated every hour, without nausea or vomiting follow its use.

Permanent cures of asthma of many years, have been made by larger doses. Sometimes these large doses (half an ounce) have not caused vomiting. At other times smaller doses vomit violently, leaving the patient much prostrated, but with disappearance of the asthma. I have cured asthmatic attacks by small doses of veratrum, when lobelia seemed indicated but had failed.

In some cases of asthma, the patient complains of a "dreadful sinking sensation" in the epigastrium with violent distressing efforts at inspiration. This is a clear indication for the use of lobelia, and it will promptly relieve such cases in doses of 1-10 or 1-100 of a drop frequently repeated.

In cough, lobelia is very useful. The cough may be caused by accumulation of mucus in the pharynx or bronchi, or a tickling in the larynx, or it may be "croupy," or attended by dyspnoea. In purely nervous coughs, like whooping cough, or from irritation of the laryngeal nerves, motor and sensory. In spasmodic croup, it is a prompt and excellent specific, and I have found it useful in carpo-pedal spasms, attended by laryngismus.

In some gastric disorders, lobelia does excellent service. In the so-called nervous dyspepsia, when the patient complains that nausea, oppression of the stomach, and dyspnoea follow each meal, when there is constant "faintness" at the stomach, as bad after meals as before eating, lobelia in doses of a drop of the one-tenth dilution before and after eating has a very happy effect.

This "faintness" at the pit of the stomach is an unfailing guide to its use. It is caused by a paresis of the sympathetic nerve; other drugs cause this symptom; ignatia, cimicifuga, digitatis, and veratrum, all cause it by their depressing action on the same system of nerves. The primary effect of lobelia on the heart is to paralyze its motor nerves, like tobacco or aconite, hence it is a prominent remedy in primary cardiac weakness and irritation. The "sinking faintness" at the epigastrium is here the symptom most complained of. Small doses must be used to combat this condition. Some patients will bear doses of one or two drops of the tincture, others are made worse by it, and only find relief from the second or third dilutions.

The secondary or reactionary effects of lobelia, is to cause violent spasmodic palpitations, or symptoms closely resembling angina pectoris. In such cases I have found quick and good results from 5 to 10 drops of the tincture.

Primarily, lobelia paralyzes the various sphincter muscles, and can be used in physiological doses, for spasmodic retention of urine, or faeces, or rigidity of the os and perineum. Its use in labor in facilitating the expulsion of the foetus is as old as the aborigines. It has been adopted by midwives and many physicians. I have seen a rigid and undilatable os rapidly give way after a single dose of 20 drops. It will allay and regulate those violent pains in the loins during labor, which seem to arise from the rigidity of the genital passages. In dysmenorrhœa, due to this same cause, small doses give prompt relief. In this respect it resembles gelsemium and belladonna.

In hysteria, lobelia is frequently indicated. The case of spasm of the larynx reported by Dr. Knowles, of Avoca, Iowa, in my "Therapeutics of New Remedies," is an apt example of a manifestation of hysteria, rapidly cured by this remedy. I have controlled the most violent hysterical convulsions by injecting into the rectum a teaspoonful of the tincture.

In gall stone or renal colic, in incarcerated hernia and in spasmodic gastralgia lobelia often relieves promptly. This may be said to be antipathic, but I do not believe it. The secondary effect of all paralyzants is spasm and convulsion. Lobelia is as homœopathic to spasm, as to paralysis.

MEDICAL USES OF LOBELIA IN THE ECLECTIC SCHOOL.—(Written for publication by Prof. John M. Scudder, M. D., Professor of the Practice of Medicine in the Eclectic Medical Institute, Cincinnati).—We use lobelia for its emetic, its relaxant and its stimulant influence. It is a fair example of the common fact that the action of a drug depends upon its dose. Emesis may be called its poisonous action, and stimulation its medicinal action. In poisonous doses the drug would prove fatal to life were it not that it is expelled from the stomach and exhausts itself in the act of emesis.

Without discussing the advantages of thorough emesis, as compared with other treatment, it may be remarked that the indications and contra-indications for emetics are as distinct as for other remedies. If the patient has full tongue, full pulse, full tongue, heavily coated at base, with sense of fullness and oppression in the epigastrium, lobelia will act kindly. Conversely if the tissues are contracted, the pulse small or hard, and the tongue contracted and red, the emetic should not be used.

In the early part of the century lobelia in substance (usually the powdered seed) was given as an emetic. From this use came the extreme prostration with cold clammy perspiration and enfeebled respiration and circulation, a condition known as the "alarming symptoms." There is no doubt, but that lobelia has occasionally caused death, but this result has been rare as compared with the large number of cases in which the drug has been used.

It was not long before it was determined that an acid preparation of lobelia acted more kindly than the crude article, or indeed any other preparation. The acetous tincture was easily and cheaply prepared by simply macerating the herb and seed with vinegar, and whether as an emetic or a nauseant expectorant its influence was certain and kindly.

The relaxant influence of lobelia was twofold, as it was exerted on the voluntary and involuntary muscles. For the first, it was the result of more or less profound nausea, induced by large doses just short of emesis. This effect was frequently called "antispasmodic," and was that desired in infantile convulsions, puerperal convulsions, hysteria, tetanus and some cases of asthma. This protracted nausea was also thought necessary to the establishment of mucous secretion from bronchial tubes, the so-called expectorant action.

Its action on the involuntary muscular fiber was not dependant upon nausea. Probably its best and most certain action was in cases of difficult labor from rigidity of the os uteri. In this case an alcoholic tincture from the seed was employed, twenty drops being added to two ounces of water, a teaspoonful was given every fifteen minutes until dilatation was accomplished.

With a full and oppressed pulse and a sense of oppression in the chest lobelia is one of our most certain remedies. The small doses (tincture of the seed) not nauseant, gives relief and a better circulation of blood.

In neuralgia of the heart, and in angina pectoris, no remedy that I have used gives such prompt relief. Frequently a single dose of ten or fifteen drops of a tincture of the seed will give almost immediate relief.

Before the use of belladonna to remove congestion of the brain (patient being comatose) nothing was deemed so certain as a lobelia emetic. In the eruptive fevers with tardy appearance or retrocession of the eruption, nothing was so effective in relieving the nervous system and bringing the eruption to the surface as a lobelia emetic properly given.

When remedies are used in combination it is almost impossible to determine the action of a single agent. Thus many compounds containing lobelia have been highly commended, and have done good service, but what part should properly be credited to this agent we cannot say. Among these combinations none has acquired a greater reputation than the compound stillingia liniment, composed of oils of lobelia, stillingia and cajuput, with alcohol.* This has certainly a wonderful action in croup, and I have satisfied myself by experiment that a principal action is from the oil of lobelia.

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- 1837.—The Thomsonian Recorder, pp. 192, 199, 252, 315, 330, 334, 384, 388, 402.
- 1837.—The Western Medical Reformer, pp. 126, 189.
- 1838.—American Journal of Pharmacy, p. 98.
- 1838.—The Botanico-Medical Reformer, pp. 26, 61, 72, 100, 102, 118, 128, 134, 138, 142, 163, 189, 206, 227, 234, 236, 238, 299, 305, 400.
- 1838.—The Southern Botanic Journal, pp. 36, 77, 153, 253, 354.
- 1839.—Lobelia Advocate and Thomsonian Medical corder, by Rev. John Rose.*
- 1840.—Pharmacopœia of the United States, pp. 25, 21
- 1840.—American Journal of Pharmacy, p. 280.
- 1840.—Pharmacopée Universelle, Jourdan, p. 802.
- 1840.—Elements of Materia Medica, Pereira, Vol. II 385.
- 1841.—The Thomsonian Materia Medica, Thomson, p.
- 1841.—American Journal of Pharmacy, p. 1.
- 1841.—The Botanico-Medical Reformer, p. 168.
- 1841.—New Remedies, Dunglison.
- 1841.—American Vegetable Practice, Mattson, Vol pp. 160 to 174, 312, 317, 404.
- 1842.—The Botanico-Medical Reformer, pp. 47, 88, 198, 203.
- 1842.—American Journal of Pharmacy, p. 4.
- 1842.—A Treatise of the Materia Medica and Therapeutics, Eberle, pp. 67.
- 1842.—Botanic Theory and Practice of Medicine, Wor p. 594, 611, 620, 627.
- 1843.—Pharmaceutischer Central-Blatt, No. 31, July
- 1843.—General Therapeutics and Materia Medica, Dunglison, Vol. I., p. 121; Vol. II., p. 197.
- 1843.—American Journal of Pharmacy, p. 108.
- 1844.—The Sick Man's Friend, Sanborn, pp. 96, 243.
- 1844.—Medicines, Their Uses and Mode of Administration, Neligan, p. 215.
- 1844.—Botanico-Medical Recorder, pp. 252, 237, 372.
- 1845.—Botanico-Medical Recorder, p. 162.
- 1845.—The Practice of Medicine on Thomsonian Principles, Comfort, p. 441.
- 1845.—Elements of Materia Medica and Therapeutics, Harrison, Vol. II., p. 447.
- 1846.—The Medical Formulary, Ellis, p. 46.
- 1846.—Botanico-Medical Recorder, p. 74, 77, 259.
- 1847.—Materia Medica and Therapeutics, Royle, (by son,) p. 456.
- 1847.—Family Flora and Materia Medica Botanica, G plate 27.
- 1847.—Botanico-Medical Reference Book, Biggs, pp. 586, 588.
- 1847.—The American Practice, Beach, (and other tions,) p. 661.
- 1847.—Medical Botany, Griffith, p. 418.
- 1848.—Medicinal Plants of New York, Lee, p. 35.
- 1848.—Mayne's Dispensatory and Formulary, pp. 56, 204.
- 1848.—Medicinal Plants of South Carolina, p. 785.
- 1849.—Elements of Materia Medica and Therapeutics, Kost, pp. 78 to 86, 198, 227, 487.
- 1850.—Pharmacopœia of the United States, pp. 29, 2
- 1850.—Pharmaceutical Journal and Transactions, (X.) p. 270.

*This unique publication was issued monthly in the interest of the lobelia practice, during the year 1839 was not supported, and only one volume appeared. We are indebted to Dr. Charles Rose for the volume comp probably the only copy in existence. In its front is bound the "Trial of Dr. Frost." We do not refer to pages in work, its title showing that the entire subject is connected with lobelia.

- 1850.—The Physio-Medical Recorder and Surgical Journal, p. 183.
 1850.—Medicinal Plants of the United States, Clapp, (Am. Med. Report,) pp. 807 to 809.
 1851.—Pharmaceutical Journal and Transactions, pp. 270, 561.
 1852.—The Eclectic Dispensatory, King and Newton, p. 246.
 1853.—Principles of Scientific Botany, Bickley, p. 175.
 1854.—Eclectic Medical Journal, Cincinnati, p. 312.
 1854.—An Improved System of Botanic Medicine, Howard, pp. 328 to 338.
 1854.—The Elements of Materia Medica or Therapeutics, Pereira, (Carson's edition,) Vol. II., p. 583 to 587.
 1855.—The Middle States Medical Reformer, pp. 1 to 4, 44.
 1857.—Druggist's Circular, p. 158.
 1857.—Materia Medica and Therapeutics, Mitchell, p. 567.
 1859.—Domestic Medicine, Kost, pp. 307, 362, 366, 380, 383, 437.
 1860.—Pharmacopœia of the United States, pp. 34, 331.
 1861.—Book of Formulæ, Tilden & Co., p. 73.
 1864.—Therapeutics and Materia Medica, Stillé, p. 280.
 1864.—Eclectic Medical Journal, Cincinnati, p. 141.
 1865.—American Journal of Pharmacy, p. 211.
 1865.—Proceedings American Pharmaceutical Association, p. 211.
 1866.—American Eclectic Materia Medica and Therapeutics, Jones & Scudder, pp. 13, 112, 113, 235, 675.
 1867.—Eclectic Medical Journal, Cincinnati, p. 269.
 1869.—Eclectic Medical Journal, Cincinnati, p. 237.
 1870.—Pharmacopœia of the United States, pp. 36, 63, 313.
 1870.—Eclectic Medical Journal, Cincinnati, pp. 206, 400, 445, 476.
 1871.—Botanical Survey of Louisiana, Featherman, p. 96.
 1871.—Eclectic Medical Journal, Cincinnati, pp. 10, 145.
 1872.—American Journal of Pharmacy, p. 293.
 1872.—Pharmacopœia Homœopathica Polyglottica, pp. 106, 190.
 1872.—Druggist's Circular, p. 160.
 1873.—Dictionary of Pharmaceutical Science, Sweringen, p. 253.
 1873.—Druggist's Circular, p. 56.
 1874.—Eclectic Medical Journal, Cincinnati, p. 46.
 1875.—Hale's New Remedies, Vol. II., p. 416.
 1875.—On Poisons, Taylor, p. 735.
 1875.—American Journal of Pharmacy, p. 127.
 1875.—Boston Medical and Surgical Journal, Feb. 4th.
 1875.—Druggists Circular, p. 66.
 1876.—New Remedies, Wm. Wood & Co.
 1876.—Eclectic Medical Journal, p. 125.
 1876.—Journal of Materia Medica, Bates & Tilden, p. 103.
 1877.—Encyclopædia of Pure Materia Medica, Allen, Vol. V. p. 611.
 1877.—American Journal of Pharmacy, p. 588.
 1877.—The Pocket Formulary, Beasley, p. 237.
 1877.—Pharmaceutical Journal and Transactions, p. 958.
 1877.—New Remedies, Wm. Wood & Co., p. 366.
 1877.—The New Materia Medica and Therapeutics, Goss, pp. 17, 31.
 1877.—Eclectic Medical Journal, Cincinnati, pp. 290, 578, 579.
 1878.—American Journal of Pharmacy, p. 254.
 1878.—Eclectic Medical Journal, Cincinnati, p. 78.
 1878.—Pharmaceutical Journal and Transactions, London, p. 561.
 1878.—Organic Constituents of Plants, Wittstein, p. 122.
 1878.—Dispensatory and Pharmacopœia of North America and Great Britain, Buchanan & Siggins, pp. 194, 196, 574.
 1878.—New Remedies, Wm. Wood & Co., pp. 21, 84.
 1879.—Pharmacographia, Fluckiger & Hanbury, p. 400.
 1879.—National Dispensatory, (and subsequent editions,) p. 859.
 1880.—Pharmacopœia Homœopathica, Polyglotta, p. 222.
 1880.—Pharmacopœia of the United States, pp. 8, 131, 211, 349.
 1880.—Therapeutic Gazette, pp. 34, 94.
 1882.—New Remedies, Wm. Wood & Co., p. 240.
 1882.—Druggist's Circular, p. 158.
 1884.—Plant Analysis, Dragendorff, (Greenish's Translation,) pp. 50, 202.
 1885.—Materia Medica and Therapeutics, Bartholow, p. 583.
 1886.—American Journal of Pharmacy, p. 392.

We do not consider it necessary to mention all the works that refer to this plant and its compounds. Since 1809 medical publications of every description have continually mentioned the plant, and medical references are innumerable. In order to arrive at a correct understanding of the subject, we made comparative studies of the record as found in the preceding works, and have found other publications to present no additional facts. We may safely say that the lobelia history can be as intelligently studied in these as by the aid of additional numberless works that mention the plant.

LOBELIA SYPHILITICA.

BLUE LOBELIA.

PART USED.—The entire flowering plant* *Lobelia syphilitica*, *Linnaeus*.
Natural Order, Campanulaceæ, Tribe Lobeliæ.

BOTANICAL DESCRIPTION.—Blue Lobelia is generally found in damp, low grounds, wet meadows, and especially near streams. The stem is usually unbranched and grows erect from one to two feet high. It is angular below and smooth for the most part, or with a few scattered hairs. It has numerous horizontal leaves and late in summer a terminal showy spike-like raceme of large blue flowers.

The leaves are ovate-lanceolate, tapering to both ends, sessile or the lower with a margined petiole, and are three to five inches long, veiny, soft, dark green above, and lighter beneath. The margins are irregularly, erosely serrate. The leaves are very numerous, and as they are gradually shorter from the bottom up they give the plant a pyramidal aspect.

The flowers appear the later part of August, lasting till frost. They have the same general structures as those of *Lobelia inflata*, the same characteristic corolla tube, but are much larger, being about one inch long. They are borne on short thick hairy peduncles in a terminal raceme.

The flowers are subtended at their base with leafy bracts which are large and leaf-like below and smaller above. The bracts have margins ciliate with white hairs, and when the plant is just beginning to develop its inflorescence, these bracts form a dense, roseate, terminal cluster, the numerous marginal hairs giving it a glandular appearance.

The calyx segments are five and are triangular, and have recurved margins which are prolonged at the base forming an ear-like appendage at each angle between the segments.† The segments are about three-quarters the length of the corolla tube.

The corolla tube is from one-half to three-quarters of an inch long, split to the base on the upper side, and prominently five-lobed beneath, the interior angles

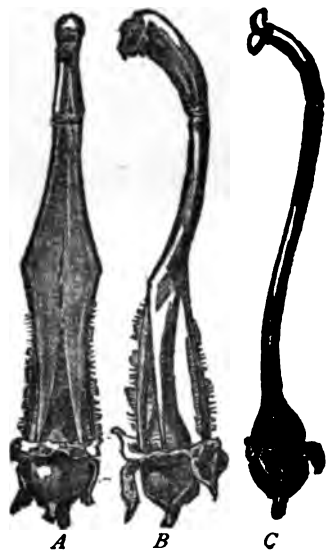


FIG. 139.

The stamenate and pistillate columns of *Lobelia syphilitica*; a, front (under) view of a column; b, side view of same; c, pistil, stamens being removed. (Enlarged).



FIG. 138.

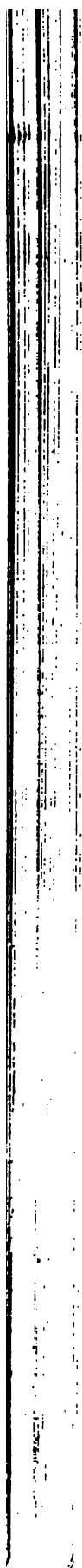
A flower of *Lobelia syphilitica*.
(Natural size).

*The Homœopaths who are the only school of medicine that use the plant employ a tincture of the entire plant. When introduced into medicine the root was the part employed.

†These ear-like appendages are not found on all species of *Lobelia* and form an artificial means of dividing the genus.



LOBELIA SYPHILITICA.
(FLOWERING SPIKE, NATURAL SIZE.)



being of a brighter (almost white) color. The three lobes forming the lower lip of the corolla are reflexed, broadly triangular and subequal.

The five stamens are united together around the pistil, forming a column about the length of the corolla and protruding through its slit. This column is three-sided at the base and curved downward at the summit as shown in figure 139, p. 98. The five united anthers are not equal, the lower two being slightly shorter and tipped with a cottony tuft; they are of deep purple color and open with shallow slits down the back.

The pistil is enclosed in the tube formed by the stamens. This is a provision of nature that insures cross-fertilization. When the flower first opens and the stamens shed their pollen, the stigma is completely enclosed by the anthers and thus is prevented from receiving any of the pollen; afterwards when the pollen has been scattered, the style elongates, pushing the stigma a line or two beyond the tube, and is then fertilized by pollen from other flowers, mostly through the agency of bees and other insects.

Blue Lobelia is a very showy plant when in bloom, the deep blue color of the large flowers making it conspicuous. This color is well preserved when the plant is pressed carefully with frequent change to dry papers, but fades out in course of several months from the dried specimens. Sometimes, very rarely however, albinos are found with pure white flowers.*

After blooming the corollas do not fall off, but turn brown, wither up, and remain attached to the ripening seed-pods.

COMMON NAMES.—The most common name and the one most generally used for this plant is Blue Lobelia. While there are other species of Lobelia with blue flowers, (in fact all but a few have this color), still, the flowers of this plant are so much larger, conspicuous and brighter blue than any other, the name properly belongs to it. In most books it is called Blue Cardinal flower, sometimes incorrectly abbreviated to Blue Cardinal, but in our opinion the name is not appropriate. Cardinal flower is a name applied to Lobelia cardinalis, not from any resemblance of form to a Cardinal's cap, but from the bright scarlet color of its flowers. Lobelia cardinalis, the first species introduced into Europe was very properly called Cardinal flower ("Cardinale couleur de feu"—Tournefort, 1719), and when a second species, but with blue flowers was introduced, it was quite naturally called *Blue* Cardinal flower. We think that this is contradictory, the name Cardinal as applied to the flower refers exclusively to the color, and it is manifestly wrong to speak of Blue Cardinal in the same sense.

It is said that among the more ignorant classes who used this plant in domestic practice, it was known as High Belia, the supposition being that as the other kind (*Lobelia inflata*) was called *Low* Belia this must be the *High* Belia.

BOTANICAL HISTORY.—This plant was in cultivation in England as early as 1665, as it was mentioned in Rea's Flora published in London in that year, and it was cultivated in France no doubt a number of years earlier, it being mentioned by Lobelius in 1591.†

*These were noticed and described as a distinct species as early as 1680 by Morrison. Tournefort, 1719, calls them by the common name "Cardinale blanche." They are according to our observation of a rare occurrence. Although the plant is a common one around Cincinnati, we have seen but a single albino. This was growing in a patch of the ordinary blue flowers, and it was *pure white* without a trace of coloring.

†Lobelius Icones Stirpium, Antwerp, 1591, mentioned under the name *Trachelium Americanum, flore ca-*

In most early works it was described under the generic name *Rapunculus*.^{*} When Linnæus was preparing his *Species Plantarum*, Peter Kalm† had just returned (1751) from America with wonderful accounts of the virtues of this plant as a certain cure for syphilis,‡ (see Medical History,) and Linnæus gave the name *syphilitica* as the specific name for the plant.§

Although its reputation as a cure for this disease has long been disproved, still the name remains, and probably always will, a monument of an early error. It has never had but one synonym, *Rapuntium syphiliticum*, by Miller.

DESCRIPTION OF THE DRUG.—All parts of *Lobelia syphilitica* are devoid of prominent characteristics. The plant is insipid and herb-like, the fresh root has simply a turnip-like taste. The root is the portion that was directed to be used when the plant was introduced, but at present no portion of the plant is an article of commerce.

According to Rafinesque|| it was once analyzed in France, but the result did not show it to contain a characteristic constituent. We did not consider it necessary to make any investigation.

Lobelia syphilitica has never been officinal, but was recognized by the Pharmacopœia of the Massachusetts Medical Society, 1808. It is not found in commerce and is not used in domestic medicine.

MEDICAL HISTORY.—We have stated above that Peter Kalm in his travels through North America was informed by Sir William Johnson¶ that the Indians used this plant to cure

ruleo. (Linnæus' citation to this in *Species Plantarum*, and in later editions, [not 1st.] is "Rob. ic." and Barton copies the error).

^{*}*Rapunculus Americanus*, flore dilute cœruleo.—Dodart, *Mémoires pour servir à l'Histoire des Plantes*, Paris, 1676, p. 297.

Same—Tournefort, *Institutiones Rei Herbariæ*, Paris, 1719, p. 163.

Rapunculus galeatus Virginianus, flore violaceo majore.—Morison, *Plantarum Historia universalis*, Oxoniensis, 1680, vol. ii., p. 466.

†Peter Kalm was a Swedish naturalist who traveled three years in the northeastern portion of this country from the fall of 1747 to the spring of 1751. He was a pupil of Linnæus, and it was at his advice that the journey was made. On return to Sweden he wrote a detailed account of his travels, which was published in three volumes in 1753, 1756 and 1761, and was translated into German, French and English, the latter translation by J. R. Forster was printed in London in 1770-71.

It was Kalm who furnished the most of the specimens of North American plants described in the *Species Plantarum* of Linnæus. These plants are marked with the letter K, in the Linnæan herbarium, and constitute the greater part of the plants from this country that are in the collection.

When Kalm was in this country he learned from Sir William Johnson of the reputation of *Lobelia syphilitica* among the Indians for the cure of syphilis, and on his return wrote an account which was published in Latin.

‡Kalm published his account in the *Act. Acad. Scient. Holmen*, under the title "*Lobelia ut efficax remedium contra lueem venereum*, a Petro Kalmio descripta."

And another account in Latin was written in 1756, by Peter Engstroem, a pupil of Linnæus, and published in the *Amœnitates Academicæ*, vol. iv., p. 524.

§*Species Plantarum*, Linnæus, 1753, page 931. Described in the Class "*Syngenesia Monogamia*" and with the following specific description.

"*Lobelia caule erecto, foliis ovato-lanceolatis crenatis, calycum sinibus reflexis.*"

||*Medical Flora of the United States*, vol. ii., p. 25.

¶Sir William Johnson was born in Smiltown, Ireland, 1715. In 1738 he came to America and located in the south side of Mohawk Valley, about twenty-four miles from Schenectady, N. Y., and embarked in traffic with the Indians whose friendship he managed to secure. He learned their language, studied their customs and won their confidence. He possessed greater influence over them than any other white man, and was adopted into the Mohawk tribe and chosen sachem. In the French war, 1743 to 1748, he was the sole superintendent of the Indians of the frontier; occupied positions of trust in Colonial affairs and embarked with the Indian allies in the wars between England and France. He engaged in the capture of Fort Niagara, 1759, where he had command after Prideaux was killed, and he assisted in the capture of Montreal, 1760. For his service he was awarded a good salary by George II., a baronetcy and \$25,000 by Parliament, and a tract of 100,000 acres of land, north of the Mohawk, known as "Kingsland" or the "Royal Grant." This tract of land is now in Herkimer Co., N. Y.

He published a paper on "Customs, Manners and Languages of the Indians." (*Phil. Trans.* Nov. 1772, p. 142). In 1774 he died.

At some period of his life, (date unknown to us, but before 1751 as he communicated it to Kalm) he purchased from the Indians (or a trader) an asserted remedy for syphilis, which proved to be a species of *Lobelia*, and the plant was exported to Europe to cure that disease. From this reason the plant received its name *Lobelia syphilitica*. In this

syphilis,* and upon his return to Europe, published an account of it. This introduced the drug to Europe, and it came into immediate demand, and it was illustrated in Woodville's Medical Botany, which was published in the beginning of this century. We cannot find that Johnson made any written reference to the drug, and we have searched his manuscripts upon file in Albany, which comprise a voluminous correspondence on all matters connected with Indian life on the frontier.† We cannot find a reference in European literature to any statement beside that of Kalm and we therefore conclude that this information derived personally by Kalm, introduced the plant.

Schoepf, 1787,‡ mentioned *Lobelia syphilitica*, but erroneously described to it, nauseating, cathartic and emetic properties, stating that it is acrid, milky, and used in syphilis. He confused the sensible properties of *Lobelia inflata*, with which he was evidently familiar, with the reputed medical properties of *Lobelia syphilitica*. Thus, his statements regarding the uses of *Lobelia syphilitica* agreed with Kalm, but there is no evidence to show that he did not derive his information from Kalm's writings.

From the return of Kalm (1751) to Europe, until the introduction of *Lobelia inflata* by Thomson,§ the drug known as *lobelia* was the root of *Lobelia syphilitica*. This is shown by the fact that the decoctions were freely administered, which could not have been the case with a violent emetic like *Lobelia inflata*. Thus, we quote from Buchan, 1793,|| "The patient takes a large draught of the decoction early in the morning and continues to use it for his ordinary drink through the day." This name *lobelia*, led subsequent writers (after *Lobelia inflata* appeared) to confuse the two plants, and the result is sometimes evidenced at present.

Statements have been made to the effect that *Lobelia syphilitica* has diuretic properties, but Prof. W. P. C. Barton, 1802,¶ found that the plant then used by the settlers under the name *lobelia* was *Liatris spicata*.

Thatcher, 1810,** states on Pearson's word that *Lobelia syphilitica* has cathartic properties, but it is questionable as to the drug employed.

Rafinesque, 1830,†† accepts that *Lobelia syphilitica* is a potent drug, but his views were framed from previous statements. Investigations in Europe demonstrated that *Lobelia syphilitica* was of no value in the treatment of syphilis and it eventually became obsolete. Neither, the Regular, nor the Eclectic sections of American practitioners of medicine employ it at all, and that it is but little employed in Homœopathy is evident from the following article:

THE HOMŒOPATHIC USES OF LOBELIA SYPHILITICA.—(Written for this publication by Edwin M. Hale, M.D., Emeritus Professor of Materia Medica and Therapeutics in the Chicago Homœopathic College.)—This plant was introduced into our practice by the late Dr. Hering. His provings and observations were published in the Trans. Amer. Hom. Institute.

Drs. Jeanes, Williamson and Neidhard, only the latter now living, contributed their experience with this drug. Dr. Jeanes reports a cure of "melancholia" in a woman. He supposed the spleen was affected, for she had "pains under the short ribs of the left side, from front to back." These symptoms are

connection we are led to say upon information received from a gentleman, familiar in the neighborhood of "Johnson's Castle," New York, that by tradition the moral standing of Sir William Johnson was not of the highest, and that possibly he may have had use for the plant himself.

*Johnson purchased the information from the Indians and its announcement was considered of the greatest importance by the medical world. He was imposed upon, however, and it seems strange that a man so versed in Indian customs should have been thus deceived.

†These manuscripts in the State's Dep't Albany show the interest and influence Johnson possessed in early Colonial affairs. His aid was solicited by those high in power and he must have had the unbounded confidence of the Indians.

‡Materia Medica Americana, p. 128.

§See medical history of *Lobelia inflata*, p. 83.

||Domestic Medicine, William Buchan, Edinburgh, p. 513.

¶Collections for a Vegetable Materia Medica, part 2nd, p. 37.

**American New Dispensatory, p. 149.

††Medical Flora of the United States, vol. ii., p. 25.

in its provings, and nearly identical symptoms have often been cured by *cimicifuga*. Dr. Neidhard reported a cough of four weeks duration, day and night, with "dryness of the back part of the throat." He also cured cases appearing to be a species of spinal irritation with *sciatica*.

Many of its symptoms remind one strongly of *cimicifuga*, but its chief sphere of action seems to be upon the mucous surfaces of the upper respiratory tract. It causes catarrhal headache, acute nasal catarrh, and much irritation with dryness of the throat. The posterior nares, palate, eyes, nose and mouth are all irritated, much as in hay fever. I would advise it in such cases, and in epidemic influenza, especially in the young. Catarrhal conditions caused by this species, if continued, would readily run into humid asthma.

Rafinesque asserts that its properties are similar to *Lobelia inflata*, but milder. It resembles arsenious iodide, *sticta*, *hepar sulphur*, *cistus* and *cimicifuga*. Our tincture is made from the leaves.

LOBELIA CARDINALIS.

CARDINAL FLOWER.

PARTS USED.—The entire plant, *Lobelia cardinalis*, *Linnaeus*.

Natural Order, Campanulaceæ, Tribe Lobeliæ.

BOTANICAL DESCRIPTION.—There is no difficulty in recognizing this plant without a detailed botanical description. Having the peculiar flower structure of the *Lobelia* genus (described on page 64) it is at once known by its bright scarlet flowers, so brilliant indeed as to attract immediate attention from anyone who sees it in bloom.

In this country we have but two red flowered species of this genus. *Lobelia cardinalis*, which is common over most of the territory east of the Mississippi, and *Lobelia splendens*, very similar in appearances, but confined to the extreme southwest near the Mexican border, and hence, not liable to be confused.

In size, habit and general appearances, the plant resembles *Lobelia syphilitica*, (described and illustrated on page 98,) but strongly distinguished from it by the color. The flowers of the *Lobelia cardinalis* are more slender, the column longer, and the calyx destitute of the reflexed auricles between the segments. Over the greater portion of this country, the two species *Lobelia cardinalis* and *Lobelia syphilitica* are all of the genus that have large enough flowers, (over an inch long) to attract attention; the former having red, the latter blue flowers, they are readily distinguished from each other and from all other species.



FIG. 140.
Flower of *Lobelia cardinalis*.
(Natural size.)

The peculiar bright red color of the large flowers of *Lobelia cardinalis* is so right as to pale almost any comparison we can make. No colored illustra-

tion we have ever seen of the plant does it justice, and the usual fault of colored work is the over-coloring of plants. When the plant is dried carefully the color is preserved as bright as when fresh, and it is very permanent, remaining a beautiful herbarium specimen for a number of years.

As so much space has been given in this work describing the botanical characters of *Lobelia inflata* and *Lobelia syphilitica*, we do not deem it necessary to give a further description of this plant.

BOTANICAL HISTORY.—The richness of coloring of the bright scarlet flowers of this plant attracted the attention of early settlers and travelers, and it was sent to Europe very soon after the discovery of this country. It was first sent to France by the French settlers in America.

Over 250 years ago, (1629,) Parkinson* described and figured it from plants in cultivation in his garden at London and informs us that he received it from France.† He states, "it groweth neere the river of Canada, where the French plantation in America is seated." It soon became common in cultivation in Europe, especially in botanical gardens, and is mentioned in most of the earliest works on American plants.‡

In the very early works it was described under the generic name *Trachelium* or later *Rapunculus*, (see generic history of *lobelia*, p. 66,) and it was called "*Planta Cardinalis*," Cardinal plant, by the earliest French.

Parkinson, the first to describe it, calls it, "the rich, crimson Cardinal's flower," stating, "this hath his name in the title, as it is called in France from whence I received plants for my garden with the Latin name; but I have given it in English."

Tournefort (1719) says, "*Cardinale, couleur de feu*" (Cardinal flower, color of fire). The name is in allusion to the bright, scarlet color of the flowers, which are the same hue as the scarlet hat worn by a cardinal, and not from the shape of the flower. Linnæus adopted this for the specific name of the plant, calling it *Lobelia cardinalis* by which name it has always been described with the single synonym of *Rapuntium cardinalis* by Miller.

MEDICAL HISTORY AND PROPERTIES.—Schœpf, 1785,§ first referred to this plant, describing it as milky and acrid, and possessing properties similar to those of *Lobelia syphilitica*. It is evident that he knew but little of it.

Barton, 1802,|| refers to the Cherokee Indians using an infusion of *Lobelia cardinalis*, and the powder of the plant, for worms. This is agreed to by Rafinesque, 1830,¶ who also makes very brief mention of the drug. These statements have furnished the foundation for subsequent writers to class the plant with anthelmintics, as is usually done. However, the Indians made but little use of it, if any, preferring *spigelia*, and even Prof. Barton gives but little attention to the drug. The plain facts are that absolutely nothing is known regarding the medical action of the plant.

*John Parkinson was an apothecary of London in the sixteenth century when botany was in its infancy. He wrote two very extensive works, which remain to this day as monuments of his perseverance and labor; the first, *Paradisi in Sole Paradisus Terrestris*, a description of the different species and varieties of plants in cultivation in English gardens and the first work describing and figuring these plants; the second, *Theatrum Botanicum*, a description of all the then known plants of the world, about 3800.

†*Paradisi in sole Paradisus terrestris*, John Parkinson, London, 1629, page 356 and plate 355.

Described under the name "*Trachelium Americarum, flore ruberrimo, sive Planta Cardinalis*."

‡1629.—Parkinson *Paradisi*, p. 356.—*Trachelium Americarum flore ruberrimo, sive Planta Cardinalis*.

1718.—Ruppius, *Flora Jenensis*, p. 201.—*Cardinalis rivini*.

1644.—Columna, *Notis et Additionibus ad Rerum Medicarum, Recho*.—*Rapuntium maximum coccineo spicato flore*.

1719.—Tournefort, *Institutiones Rei Herbariæ*, p. 163.—Same.

1680.—Morison, *Historia Plantarum*, part 2, page 466.—*Rapuntium galeatum, virginianum seu americanum, coccines flore majore*.

1737.—Linnæus, *Hortus Cliffortianus*, p. 426.—*Lobelia caule erecto, foliis lanceolatis obsolete serratis, racemo terminatrici*.

1739.—Gronovius, *Flora Virginica*, p. 134.—Same.

1740.—Royer, *Flora Leydensis*, p. 241.—*Lobelia caule erecto, foliis lanceolatis serratis, spica terminale*.

1748.—Linnæus, *Hortus Upsaliensis*, p. 276.—Same.

‡*Materia Medica Americana*, p. 128.

‡Collections for a *Materia Medica*, part 1st, p. 40, and part 2nd, p. xiv.

¶*Medical Flora of the United States*, vol. ii., p. 26.

CONSTITUENTS.—Prof. William Procter, Jr., 1839,* made an analysis of *Lobelia cardinalis* containing an alkaloidal-like body as follows. The herb was dried, macerated with water that had been acidulated with acetic acid, the watery product neutralized with magnesia and then exhausted with sulphuric ether. The ethereal solution was evaporated, yielding an aromatic-like oily liquid of a brown color. It was soluble in turpentine, ether, and alcohol; was of alkaline reaction, neutralized acids, and formed crystalline salts with acids. Its taste was bitter and acrid. This was doubtless a mixture of an alkaloid with impurities dissolved by the ether. There has been no subsequent analysis.

Lobelia cardinalis is not a commercial drug and is not used in medicine.

LOBELIA HYPODERMICALLY.

(Discovery of Dr. E. Jentzsch, of Chicago, Illinois.)

HISTORY.—At the meeting of the Illinois Eclectic Association, 1908, Dr. E. Jentzsch of Chicago, read a paper entitled, "Lobelia; A Vegetable Antitoxin." This was of such exceptional importance, by reason of the history of Lobelia, as well as the statement of the physician, as to have led Dr. Jentzsch, before the Society, to fortify his paper by a personal injection of the Specific Medicine Lobelia, into his own circulation, in order to illustrate that it is safe hypodermically.

Following this, at the meeting of the National Eclectic Medical Association, in Kansas City, June, 1908, Dr. Jentzsch again contributed a paper on the subject of Lobelia, a Vegetable Antitoxin, and again, before the Society, he injected the remedy into his own veins, in order to quiet apprehensions concerning its possible energetic nature, when used subcutaneously.

The original paper of Dr. Jentzsch is of interest in connection with this subject, as marking the introduction of a new epoch in the use of Lobelia. Our Bulletin would not be complete without the original article of Dr. Jentzsch, which we therefore present, *verbatim*.

LOBELIA; A VEGETABLE ANTITOXIN.*

THE APPLICATION OF THIS REMEDY IN THE TREATMENT OF DIPHTHERIA.

A paper read at the Chicago meeting of the Illinois State Eclectic Medical Society, 1908.

BY E. JENTZSCH, M. D., CHICAGO, ILLINOIS.

The title of this paper reveals to some extent my intention, which is a desire to inform you of my experience with Lobelia as a vegetable antitoxin in diphtheria. I will confine myself entirely to the therapeutic discussion of the disease mentioned, basing my contentions on personal experience and observations, which extend over a period of nearly four years in about 150 cases of diphtheria, with not a single death.

Right here let me tell you that I have no longing for notoriety nor a desire to reap financial benefit from this. It is merely an effort to reduce, nay, even to abolish, the high death-rate which regularly prevails from this disease. The remedy has proven itself so universally reliable in my hands that I have no doubt that what I claim can be accomplished by you as well.

HOW I CAME TO USE LOBELIA IN DIPHTHERIA.

You may be interested to know how I came to use it. There are two vital points which are responsible. First, my studying eclectic therapeutics; second, the desperate condition of my own child who was then about three years old, due to diphtheria.

* The preparation used by Dr. Jentzsch was an alcoholic preparation of Lobelia Seed, 240 grains to the fluid ounce.

LOBELIA

To save time and trusting that you will credit me with sufficient competency in my vocation, I will say that my boy was stricken with a fulminating case of naso-pharyngeal diphtheria. The serum antitoxin was exhibited promptly in sufficiently large doses and repeated, but with no other result except that the child passed from an active sthenic condition, with dyspnea, into a passive collapse, with apnea. This I had witnessed before and knew it to be fatal with certainty. Instantly I recalled the writings of the great Scudder, where he extols Lobelia as a life-saver.

Thereupon I filled full my hypodermic syringe with the Lobelia and gave the child the entire dose subcutaneously. Strange to say, I gave it with a confidence altogether out of proportion to the circumstances. However, the result proved this to be justified, for the patient responded immediately in a marvelous manner.

All the fatal symptoms gave way to those of returning health, the patient passing from a death-struggle into a peaceful slumber, from which he awoke after three hours, somewhat weak. Another dose was given, which was followed by a still more pronounced reaction for the better. The patient from that time continued to convalesce and, with the exception of a postdiphtheria pharyngeal paralysis, made a rapid recovery, the paralysis yielding to another dose of the same remedy.

LATER EXPERIENCE WITH LOBELIA.

This happened nearly four years ago, and since then I have repeated in many cases the phenomenal experience with this remedy. At first I used the serum and the vegetable antitoxin in conjunction. But gradually I realized that the latter was entirely reliable, doing even better without the serum, so that now I can tell you with absolute certainty that the vegetable antitoxin is in every respect far superior to the serum for the reason that it is more reliable because it acts quicker and with a much greater certainty than the serum and, secondly, it prevents, arrests and cures the disease promptly, irrespective of what other treatment is instituted.

It makes no difference whether it is the first or the sixth day of the existence of the disease, with the exception that in the longer-standing cases the treatment must be repeated more often—every two to three hours, until the desired result is obtained.

I note that Dr. Walls of our City Health Department recommends a repetition of the serum every twelve hours in very bad cases, but it has been my experience that this is a slow and unsatisfactory method and usually of no avail.

The vegetable antitoxin (Lobelia) produces no symptoms whatever except those of returning health. It is therefore preferable to the serum when we consider the unpleasant symptoms which are often produced by the latter and which Dr. Walls takes great pains to pronounce harmless, although he aptly describes them as distressing (and which are known as the serum disease).

WHY THE REMEDY IS EFFECTIVE.

The use of the vegetable antitoxin is consistent with our motto, "*Vires Vitales Sustinendae.*" It strengthens all the vital functions, notably the circulation. It does not dispel the symptoms of the disease at the expense of the patient's strength. It creates no other disease but simply cures the patient, all of which can not be claimed for the serum.

Another feature of the Lobelia is that it is so cheap that the cost need not be considered; besides it is more uniform in quality, does not readily decompose, is easily carried around, and may be given by the doctor with as little ado as a hypodermic injection of morphine. It is safe as well as harmless on account of its nature and origin.

LOBELIA

What I have told you, Fellow Members, is true. I have found it to be so not in a few instances, but in many. However, I want you to convince yourselves and for that reason have given you a demonstration of the benignness of the drug.

I have preached of this before to societies and individual doctors and have found two principal arguments against its use: first, that it is a highly dangerous drug. How well founded this is you may judge by the demonstration I have given. The drug when so given is absolutely harmless. I have given in this manner a half-dram dose to an infant but a few minutes old as a means of resuscitation, with success. Let there be no more fear of this remedy.

The second assertion is that the serum antitoxin gives satisfactory results. Let me quote here the official statistics of the 1906 report published by the Chicago Health Department, which gives 547 deaths out of a little over 5,000 reported cases of diphtheria. This is an average throughout the year of 10 per cent—ten fatal cases out of every one hundred reported.

RESULTS AS COMPARED WITH THE ANTITOXIN TREATMENT

The vegetable antitoxin, in my hands, has transformed diphtheria, an otherwise dangerous and malignant disease, into a benign and harmless affection, the proof of which I have been and am willing to demonstrate to any doctor anywhere and on any case of diphtheria.

MY METHOD OF TREATING DIPHTHERIA.

In conclusion, let me give you a concise description of my method of treating diphtheria. In any case where there is the least suspicion of diphtheria I give a half-dram dose of the Lobelia hypodermically, and repeat in from two to twelve hours, once or oftener, as indicated, until reaction sets in, which means a return to health.

The drug may be used as it is or it may be filtered through ordinary filtering paper; the latter method I have adopted. For those who can gargle I give a half-dram of argyrol in six ounces of water. This I have found to be most effectual from a bacteriological standpoint, as well as the most soothing to a sore throat.

Systematic remedies I give according to specific indications. A prescription most often used by me is:

Aconite,* gtt. 1-4; Belladonna, gtt. 1-6; Phytolacca, gtt. 10; Sarracenia, drs. 2; water, q. s. ad. ozs. 4.

Directions: One teaspoonful every two or three hours.

By experience I have found the hypodermic injection best borne by the patient when injected anywhere on the trunk, abdominal parietes, the back and thighs.

As to my theory about the action of this remedy it is briefly stated. I consider it fully the peer of all stimulants of the vascular system, not only in diphtheria, but in any infectious disease, equalizing, so to speak, disturbed circulation. If there is high pressure it acts as a sedative, and if there is low blood-pressure it stimulates, but in any case its secondary action is that of a cardiac tonic.

When used as here described Lobelia is a prompt and most reliable remedy in apoplexy, epilepsy or any condition where the cerebral circulation is disturbed. In collapse due to anesthesia it is unsurpassed; likewise in pneumonia. In diphtheria I believe it has a specific antitoxin property.

This, Fellow Members, is my case. I hope I have made my purpose clear, and I thank you sincerely for your kind attention.

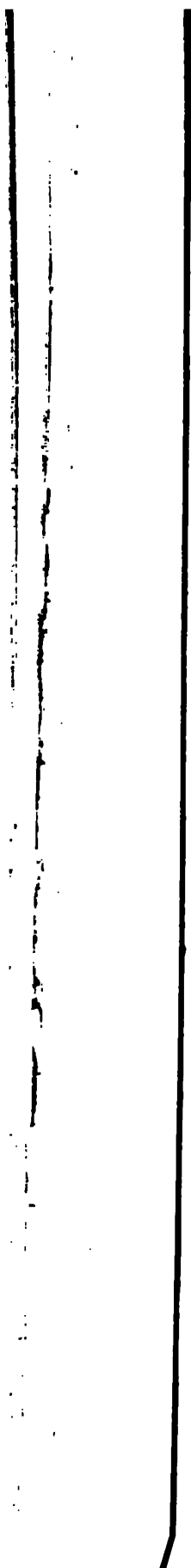
*These were alcoholic preparations representing one grain of the drug to each minim.

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FUTURE BULLETINS.

This Bulletin will be followed by a History of the American Alkaloids, Resins, Resinoids and Concentrations, comprising Bulletin Number 2, Pharmacy Series. In connection with the historical data therein contained, it will be possible to present incidents known to the editor, together with much information derived from personal correspondence with those concerned in our historic epoch in American Pharmacy and Medicine. This leads us to believe that the proposed Bulletin will be one of the most valuable as yet issued by us.





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